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Mathematics

For Sixth form primary

First term

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My dear pupils of sixth grade primary... it give us pleasure to introduce this book to you as part of developed mathmastics series. We dedicated many things for you when we composing this book many things were taken in consediration in order to make studying mathematics an interesting popular and useful duty for you:

(1) Displying the topics in the easiest way and clearness using aproperiate language that adope with your information and experiences. So that it will help you to cope in the knowledge and ideas which were involved in each topic alon.

- The given ideas are listed gradually from the simplest to the hardest.
- We ensure forming the new concepts and ideas correctly before setting up associated operations via suitable activates.
- Linking the mathematical lessons with life through realistic Issues and problems in various applications hoping that you will fell the value of the mathematics and studying it thing a useful in life.
- At many points within this book we give you opportunity to deduce ideas and reach information your self depending on your experiences and thinking to develop searching and self learning.
- At other points we invite you to work in groups with your colleagues to know their ideas and introduce to gather one part work.
- At other points too we want you to check the solution which were introduced to enrich your self confident and increase your ability to the corre tness of things.
- The book was divided into units, the units were divided into lessons which involved with Images figures and illustrated diagrams. At the end of each lesson evaluated exercises were put, besides general exercises and unit test.

The book end contains model answers.

- The unit end contains activity to practice (UK) with your teacher help and you will find technological activity to deal with computer.

Finally... my dear pupil, in your classroom with your teacher and classmate, you should act posietily. Don't hesitate to ask questions. Trust that your participating will be appreciated, remember forever, mathematics involve many questions have more than one solution.

We ask Allah that, we did well for our lovely Egypt.

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Unit 1 :

Ratio

Lesson (1) : **Meaning of the ratio**

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Lesson (3) : **Miscellaneous exercises on ratio and its properties**

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Lesson (5) : **Ratio Applications (Rates)**

- **General exercises on unit 1**
- **Technological activity**
- **Activities on unit 1**
- **Unit test**

1 *Meaning of Ratio*

What do you learn from this lesson?

- Through your active participation you can come to:
* The meaning of the ratio.
* expressing the ratio.
* elements of ratio.

The mathematical concepts of :
* The ratio between two quantities.
* The antecedent of the ratio.
* The consequent of the ratio.

Notice and Discuss what is Ratio?

Ratio is a way of comparing between two similar quantities for example:

(1): Comparing between prices

In the opposite figure,below the price of the blouse is LE 40 and the price of the Trousers is LE 80. We can compare between the prices as follows :

a) the price of the blouse is less than the price of the trousers or the price of the trousers is greater than the price of the blouse.

b) The price of the blouse = $\frac{1}{2}$ the price of the trousers

because $\frac{\text{price of the blouse}}{\text{price of the trousers}} = \frac{40}{80} = \frac{4}{8} = \frac{1}{2}$.

c) The Price of the trousers is double the price of the blouse because $\frac{\text{price of the trousers}}{\text{price of the blouse}}$
$= \frac{80}{40} = \frac{8}{4} = 2$

• The fraction $\frac{\text{price of the blouse}}{\text{price of the trousers}} = \frac{1}{2}$

Is called the ratio of the price of the blouse to the price of the trousers.

Also $\frac{\text{the price of the pair of trousers}}{\text{price of the blouse}} = \frac{2}{1}$ (is called the ratio of the price of the trousers to the price of the blouse.

(11): Comparing between lengths :

From the opposite figure we can compare between the height of the tree (3 metres) and the height of the house (9 metres) using one of the following methods.

a- The height of the house exceeds the height of the tree or the height of the tree is less than the height of the house.

b- The height of the house is greater than the height of the tree.

or the height of the tree is less than the height of the house.

c- The height of the house is three times the height of the tree.

Because $\frac{\text{The height of the house}}{\text{The height of the tree}} = \frac{9}{3} = \frac{3}{1} = 3$

The fraction $\frac{9}{3}$ is called the ratio

or the height of the tree is third of the height of the house.

because $\frac{\text{The height of the tree}}{\text{The height of the house}} = \frac{3}{9} = \frac{1}{3}$

The fraction $\frac{1}{3}$ is called the ratio.

Now we hope that you can recognised the meaning of the ratio

As comparing between two similar quantities or numbers and of the same unit then the resultant fraction is called the ratio.

i.e. The ratio between two numbers $= \frac{\text{The first number}}{\text{The second number}}$

Expressing the ratio

- In the case of the price of blouse and the price of the trousers we could express the ratio in as a fraction and is $\frac{1}{2}$.

and can be written as 1 : 2 it is read as (1 to 2) where 1 is called the antecedent of the ratio or its first term and the number 2 is called the consequent of the ratio or its second term.

- Similarly in the case of the height of the tree and the height of the house we could express the ratio as a fraction to be $\frac{1}{3}$ and it can be written as 1 : 3 and it is read as (1 to 3).

Where 1 is called the antecedent of the ratio or its first term and 3 is called the consequent of the ratio or its second term.

Drill (1) Complete :

If Khalid has LE 15 and Ahmed has LE 25 then

The ratio between what Khalid has and what Ahmed has is $= \frac{15}{25} = \frac{3}{5}$ ***or 3:5***

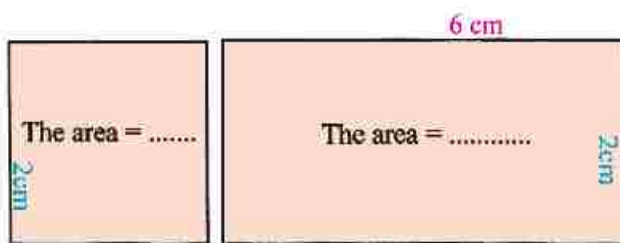
....

The ratio between what Ahmed has and what Khalid has $= \frac{\text{..................................}}{\text{..................................}}$

$= \frac{\text{..................................}}{\text{..................................}}$ or .... : ....

Drill (2) Complete :

When we compare between the area of the square and the rectangle in the figure shown then:

The area = ... (2cm)	The area = ... (6 cm × 2cm)

$$\frac{\text{The area of the square}}{\text{The area of the rectangle}} = \frac{4}{12} = \frac{\dots\dots\dots}{\dots\dots\dots}$$

or .... : ....

Remember that :
The area of the square = side length × itself
The area of the rectangle = length × width

Drill (3) Complete :

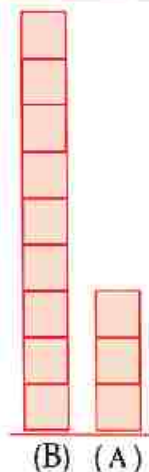
When we compare between the number of small squares in column (A) and the number of small squares in column (B) then the ratio between them is :

(a) $\frac{\text{The number of squares in column (A)}}{\text{The number of squares in column (B)}}$

$= \frac{3}{9} = \frac{1}{3}$ or $1 : 3$

(b) $\frac{\text{The number of squares in column (B)}}{\text{The number of squares in column (A)}}$

$= \frac{\dots\dots\dots}{\dots\dots\dots} = \frac{\dots\dots\dots}{\dots\dots\dots}$ or .... : ....

(B) (A)

Drill (4) :

Express the ratio in each of the following cases by two methods

(a) The ratio between the length of $\overline{AB}$ and the length of $\overline{CD}$

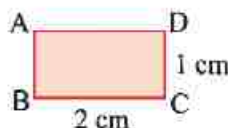
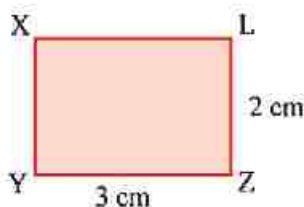
A ——— B

C ——— D

(b) The ratio between the age of Nabeel and the age of Khalid ***such that :***

The age of Nabeel = 40 years

The age of Khalid = 25 years

(c) The ratio between the area of the two rectangles ABCD and XYZL

Exercise (1 - 1)

1 Write the ratio between the two numbers 21 and 9 in the simplest form.

2 Complete the following table.

The antecedent of the ratio	The consequent of the ratio	The form of the ratio	
3	5	$\frac{.....}{.....}$	3 : 5
7	10	....	....
....	....	$\frac{7}{5}$	....
....	....	....	3 : 11

3 Write the ratio between the two numbers in each of the following in its simplest form :

(a) $\frac{19}{114}$ (b) $\frac{36}{72}$

4 In one of the classes of the first grade primary the number of boys is 15 pupils and the number of girls is 20 pupils.

Calculate : (a) The ratio between the number of boys and the number of girls.

(b) The ratio between the number of girls and the number of all pupils in the class.

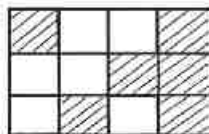
(c) The ratio between the number of boys and the number of all pupils in the class.

5 Write each of the following ratios in its simplest form :

(a) 2.5 : 5.75 (b) 0.84 : 2 $\frac{3}{9}$

6 Express the ratio between the two numbers 8 and 12 by two methods.

7 In the opposite figure complete :

(a) number of colored parts : all parts of the figure :................

(1) number of non colored parts : all parts of the figure :................

(2) number of colored parts : number of non colored non colored parts :................

2 Properties of ratio

What do you learn from this lesson?

Through your active participation you will come to :

- ratio has the same properties of the common fraction in: reduction , to simplify and comparison
- The two terms of the ratio are two integer numbers .
- The unit of each of the two terms of the ratio is the same unit.
- The ratio between two quantities of the same kind has no unit.

The mathematical concepts:

- The terms of the ratio.
- simplifying and comparing.
- Measuring units.

Participate and discuss

Property (1) :

The ratio has the same properties of the fraction as : reduction , simplification and comparison.

Example (1) :

Omar saved 32 pounds and Khalid saved 48 pounds.

Find the ratio between what Omar saved to what Khalid saved.

Solution :

$$\frac{\text{What Omar saved}}{\text{What Khalid saved}} = \frac{32}{48}$$

$$= \frac{8}{12} = \frac{2}{3} \text{ or } 2 : 3$$

Notice That we divided each of the two terms of the ratio by 4 then by 4 to simplification the ratio.

Example (2) :

Find the ratio between the two fractions $\frac{3}{4}$ and $\frac{5}{6}$

Solution :

$$\frac{3}{4} : \frac{5}{6} = \frac{3}{4} \div \frac{5}{6} = \frac{3}{4} \times \frac{6}{5} = \frac{9}{10} \text{ or } 9 : 10 \text{ (reduction)}$$

Similarly :

$$6.4 : 16 = \frac{64}{10} : \frac{16}{1} = \frac{64}{10} \div \frac{16}{1} = \frac{64}{10} \times \frac{1}{16} = \frac{4}{10} = \frac{2}{5}$$

or 2 : 5

(reduction and simplification)

Example (3) :

Compare between the two ratios $\frac{3}{5}$ and $\frac{4}{7}$ (using < or >)

The comparison between two ratios, the same as the comparison between two fractions :

Solution :

Due to there's no simplifiction we should get the L.C.M (lowest common multiple)

of the deominators for the two ratios become $\frac{21}{35}$, $\frac{20}{35}$

$\frac{21}{35} > \frac{20}{35}$ That means

The first ratio is greater than the second ratio

Then $\frac{3}{5} > \frac{4}{7}$

Drill (1)

Write the ratio between the two numbers 25 and 75 .

Compare between the ratios $\frac{3}{4}$ and $\frac{5}{8}$

Property (2)

The two terms of the ratio should be integer numbers:

From the previous two examples in the first property, the final results were as follows respectively.

2 : 3 and 9 : 10 and 2 : 5

All these numbers are integrated numbers.

Property (3) :

When comparing two quantities to form the ratio between them, their measuring units must be the same.

For example :

When comparing between two lengths 160 cm and 2 metres we should firstly convert the measuring units to be the same unit.

This will be carried out by two methods.

The first: We convert 2 metres into 200cm then we use the property of simplifiction for the ratio becomes :

$\frac{160}{200} = \frac{4}{5}$ or (4 : 5)

The second . We convert 160 cm into metres to become $\frac{160}{100} = \frac{16}{10}$ metres.

Then we use the property of reducion and simplification for the ratio becomes :

$\frac{16}{10} \div 2 = \frac{16}{10} \div \frac{2}{1} = \frac{16}{10} \times \frac{1}{2} = \frac{4}{5}$ or (4 : 5)

Example (1) :

Find the ratio between $\frac{1}{2}$ kilogram and 700 grams, then compare between them using (< or >).

Solution :

To Convert to the same unit, their is two methods.

The first : Convert $\frac{1}{2}$ kilogram into 500 grams then the ratio becomes $\frac{500}{700} = \frac{5}{7}$ or (5 : 7)

The second

Convert 700 grams into kilograms

$\frac{700}{1000} = \frac{7}{10}$ kilograms

The ratio becomes $\frac{1}{2} : \frac{7}{10} = \frac{1}{2} \div \frac{7}{10} \quad \frac{1}{2} \times \frac{10}{7} = \frac{10}{14} = \frac{5}{7}$ or (5 : 7)

then $\frac{1}{2}$ kilogram < 700 grams

Drill (2)

Compare between 27 months and 3 years to get the ratio between them

Drill (3)

Compare between 2 kirats, 18 sahms, then find the ratio between them.

(Feddan = 24 kirats / Kirat = 24 sahms)

Property (4) :

The ratio between two similar quantities has no unit.

you noticed from the previous property and after converting the two quantities to the same unit that the ratio in the first case is held between length units either centimeters or metres and in the second case the ratio is hold between weight unit either in grams or in kilograms therefore the result ratio has no unit in each of the two cases because they are of the same unit.

Drill (4)

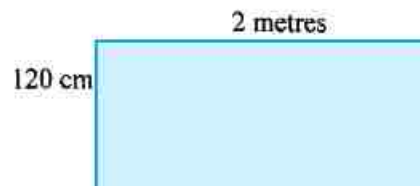
The distance between Hosam house and his sporting club is 250 metre, and the distance between his house and his school is 0.4 kilometres. Find the ratio between the two distances.

Drill (5)

2 metres

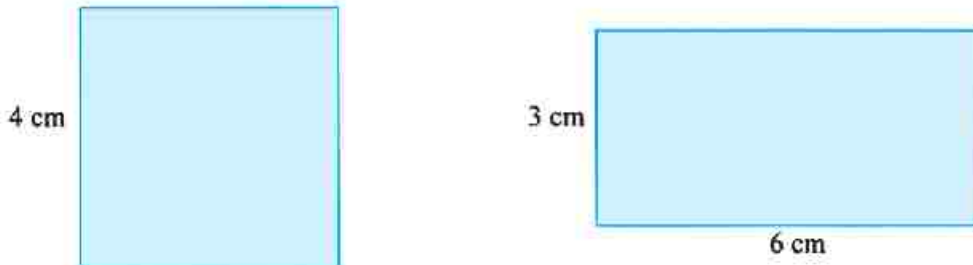
In the opposite figure

120 cm

A rectangle in which the length = 2 metres and its width = 120cm. Calculate :

(a) The ratio between the width of the rectangle and its length.

(b) The ratio between the length of the rectangle and its perimeter.

Exercise (1 - 2)

1 In the figure below, a square of side length 4cm and a rectangle whose dimensions are 6 cm and 3cm Find:

(a) The ratio between the perimeter of the square and the perimeter of the rectangle.

(b) The ratio between the area of the square and the area of the rectangle.

(c) The ratio between the length of the rectangle and its perimeter.

2 Find in the simplest form the ratio between each of the following:

(a) 250 p.t and 7 ½ pounds.
(b) 2 ½ hours and 75 minutes.
(c) The two areas : 12 kirats , 1.25 feddans.
(d) The two areas : 0.75 kirat , 16 sahms.

3 Write the ratio between the two numbers in each of the following cases :

(a) $\frac{1}{2}$ and $\frac{3}{4}$ (b) 18 : 6.3 (c) $1\frac{3}{5}$: 2.2

4 Complete the following :

- The ratio between the side length of the square and its perimeter = ……… : ....
- The ratio between the length of the side of the equilateral triangle and its perimeter = … : …

5 The area of a rectangle is $32cm^2$ and its width = 4cm . Find :

- The length of the rectangle.
- The ratio between the width of the rectangle and its length.
- The ratio between the length of the rectangle and its perimeter.

6 A salary of cleaning worker LE 400 monthly. He spends LE 340 and saves the remainder. Find:

a- The ratio between what the worker spends to his salary.

b- The ratio between what he saves to his salary.

c- The ratio between what he spends to what he saves.

7 The opposite table shows the quantities of the same kind but in different units.

Calculate the ratio between each two quantities in each case and complete the table.

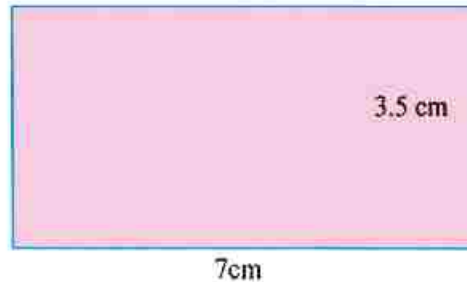
1^{st} quantitiy	2^{nd} quantitiy	1^{st} : 2^{nd}
100 gm	$\frac{1}{4}$ kg	....
8 hours	2 days	....
$\frac{1}{2}$ km	570 m	....
18 kirat	$1\frac{1}{2}$ feddan	....

8 In the opposite figure:

A rectangle with width 3.5 cm and its length = 7cm. Find :

(a) The ratio between the length and the width.

(b) The ratio between the width to the perimeter.

(c) The ratio between the length and the perimeter.

3 Miscellaneous exercises on ratio and its properties

What do you learn from this lesson?
Through your active participating you can recognize : How to :
- Calculate a quantity if you have given another quantity and the ratio between them.
- Divide a given quantity into two quantities by a given ratio.

Mathematical speciled concepts:
- The given quantity.
- The unknown quantity.
- The ratio between them.

Introduction:

Sometimes we need to calculate an unknown quantity if we know another quantity and the ratio between them .

And we sometimes need to divide a given quantity into two parts if the ratio between them is known.

Remark :

The given quantity is a specified quantity for example: as the weight of a person or the price of a good or the area of a piece of land or the number of the pupils in a school ….etc.

The unknown quantity is an unspecified quantified and we want to know it for example: the need to.
specify The weight of a person, the price of goods or the number of boys and girls in a school …. Etc.

Notice and think through the following examples .

Example (1):

If the ratio between the weight of Hani and the weight of Ahmed is 5 : 6 and if the weight of Ahmed is 60 kilogrames. Calculate the weight of Hani.

Solution

We can solve the example using the idea of the value of the part as follows:

$$\frac{\text{The weight of Hani}}{\text{The weight of Ahmed}} = \frac{5}{6}$$

That means : 6 equal parts are equal to 60 kilograms (Ahmed's weight)

That means the value of one part

$= \frac{60}{6} = 10$ kilograms

Then the weight of Hani = $10 \times 5 = 50$ kilograms

$$\frac{\text{The weight of Hani}}{\text{The weight of Ahmed}} = \frac{5}{6}$$

That means

The weight of Hani $= \frac{5}{6}$ The weight of Ahmed thus

The weight of Hani $= \frac{5}{6} \times 60 = 5 \times 10 = 50$ k.g

You can check the solution as follows :

The weight of Hani : The weight of Ahmed

50 : 60 (divided by 10)

5 : 6 (This is the given ratio in the problem).

Example (2) :

A primary school has 540 pupils. If the ratio between the number of boys to the number of girls is 4 : 5 , calculate the number of each boys and girls.

Solution :

$$\frac{\text{The number of boys}}{\text{The number of girls}} = \frac{4}{5}$$

Using the idea of the sum of parts we get :

The sum of parts = 4 + 5 = 9 parts :

That means (540 pupils) equals (9 equal parts) .

i.e. The value of one part = 540 ÷ 9 = 60 pupils.

i.e. The number of boys = 4 × 60 = 240 boys.

The number of girls = 5 × 60 = 300 girls.

You can check the solution as follows :

The number of boys	:	The number of girls	
240	:	300	(Dividing by 10)
24	:	30	(Dividing by 6)
4	:	5	(It is the given ratio in the problem)

Example (3) :

A rectangular shaped piece of land the ratio between its length and its width is 9 : 7 .

If the difference between the length and the width is 18 metres. Calculate each of the length , the width and the perimeter of the land.

Solution :

Notice that the ratio between the length and the width is 9 : 7 that means.

The length is divided into 9 equal parts and the width is divided into 7 equal parts the difference between the number of parts of the length and the number of parts of the width = $9 - 7 = 2$.

i.e. 2 parts equal 18 metres.

i.e. The value of one part = $18 \div 2 = 9$ metres

i.e. The length of the rectangular land

$= 9 \times 9 = 81$ metres

The width of the rectangular land = $7 \times 9 = 63$m.

The perimeter of the land =

(The length + the width) $\times$ 2

$= (81 + 63) \times 2 = 144 \times 2 = 288$m.

Verifying the solution:

You can check the solution as follows the length of the land : The width of the land

81 : 63	Dividing by 9
9 : 7	(it is the given ratio)

The difference between the length and the width = $81 - 63 = 18$ metre.

Drill (1)

The ratio between the heights of two buildings in a town is 4 : 7.
If the difference between their heights is 9 metres. Find the height of each of them.

Drill (2)

Two wire pieces, the ratio between their length is 5 : 9 .
If the sum of their lengths is 126 metres calculate the length of each piece.

Exercise (1 - 3)

1. The ratio between a child's age to his father's age is 2 : 13.
   If the child is 6 years, Find father's age.

2. The ratio between the lengths of two roads is 2 : 5 and the difference between their lengths is 21 km. Find the length of each road.

3. If the ratio between the number of successful pupils in Arabic subject to that number in Math is 3 : 7 and if the successful pupils in Math is 21 pupils.
   find the number of successful pupils in Arabic.

4. The ratio between the area of two pieces of lands is 5 : 9 , if the area of one of them is more than the other by 132 m^2. Find the area of the other land.

5. The ratio between the money that Ahmed has to that Which Samira has is 7 : 11
   if the money that they have were L/E 360 . Find the money that each of them has

6. A Perimeter of rectangle equals 140 cm, and the ratio between its dimensions is 3 : 4
   Calculate its area

4 *Ratio among three numbers*

What do you learn from this lesson?
Through your active participation you recognize how to :
- Find the ratio among three numbers.
- Solve miscellaneous applications using the ratio among three numbers.

Mathematical concepts
- The ratio among three number.

Notice and think:

If Adel, Ahmed and Hani saved three amounts of money which are LE 180, LE 144 and LE 108 respectively.
Then we can find the ratio among what Adel, Ahmed and Hani saved as follows.

What Adel saved	:	What Ahmed saved	:	What Hani saved	
180	:	144	:	108	(dividing by 12)
15	:	12	:	9	(dividing by 3)
5	:	4	:	3	

Example (1) :

A family formed from three persons. If the hight of the father is 1.8 metre. the hight of the mother is 1.6 metre and the hight of the son is 1.2 metre. Calculate the ratio among the three hights.

Solution :

hight of father	:	hight of mother	:	hight of son	
1.8	:	1.6	:	1.2	(multiplying by 10)
18	:	16	:	12	(dividing by 2)
9	:	8	:	6	

Example (2) :

ABC is a triangle in which AB : BC : CA = 3 : 5 : 7
If the difference between the length of $\overline{AB}$ and $\overline{BC}$ is 4cm. Find the lengths of the sides of the triangle and its perimeter .

Solution :

The ratio between the lengths of the three sides is 3 : 5 : 7 that means that $\overline{AB}$ is divided into three equal parts in length.

and $\overline{BC}$ is divided into 5 equal parts in length and $\overline{CA}$ is divided into 7 equal parts in length and all parts are of the same kind.

The difference between the length of $\overline{AB}$ and the length of $\overline{BC}$ = 5 – 3 = 2 parts that means that :

2 parts equal 4cm

i.e. the value of each part = 4 ÷ 2 = 2cm

then:

The length of $\overline{AB}$ = 2 × 3 = 6cm,

The length of $\overline{BC}$ = 2 × 5 = 10cm

And The length of $\overline{CA}$ = 2 × 7 = 14cm

Since the perimeter of the triangle = the sum of length of its sides.

Then the perimeter of the triangle = 6 + 10 + 14 = 30cm

Verifying of solution

AB	BC	CA	
6	: 10	: 14	(divided by 2)
3	: 5	: 7	(it is the given ratio)

Example (3) :

a, b and c are three numbers such that the ratio a : b = 4 : 3 and the ratio b : c = 2 : 3 . Find the ratio among the three numbers a, b and c.

Solution :

To find the ratio between the numbers a, b and c take the ratio.

$\frac{a}{b} = \frac{4}{3}$ $\qquad$ $\frac{c}{b} = \frac{3}{2}$

then $\frac{a}{b} = \frac{4 \times 2}{3 \times 2} = \frac{8}{6}$

$\frac{c}{b} = \frac{3 \times 3}{2 \times 3} = \frac{9}{6}$

then a : b : c = 8 : 6 : 9

Another solution (using L.C.M.)
Through the opposite figure

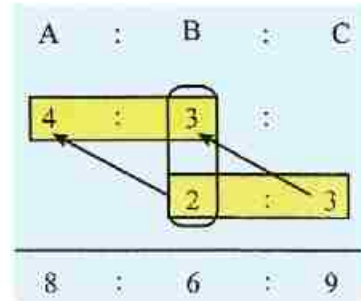
Notice that L.C.M of the two numbers 3 and 2 is 6 that means the consequent of the first ratio is 3 multiplied by 2 then it becomes 6

Therefore we multiply the antecedent of the first ratio which is 4 by 2 to be 8

Also multiply the antecedent of the second ratio which is 2 by 3 to be 6 .

Therefore multiply the consequent of the second ratio which is 3 by 3 to be 9

Then the ratio among the three numbers becomes

8 : 6 : 9

Example (4) :

If the ratio between the share of Hani and the share of Sherif and the share of Khalid is 3 : 5 : 7 and if the share of Hani is LE 24 caluclate the share of each of Sherif and Khalid.

Solution :

The share of Hani = 24 pounds and it equals 3 equal parts

i.e. The value of one part $= \frac{24}{3} =$ LE 8

Then the share of Sherif = 5 × 8 = LE 40

And the share of Khalid = 7 × 8 = LE 56

Drill

Find the ratio between the hight of Sahar, Noha and Ola if

The tallness of Sahar : The tallness of Noha

The hight of Sahar : The tallness of Noha = 2: 3

The hight of Noha : The tallness of Ola = 6 : 5

Exercise (1 - 4)

1. If the ratio between the measures of the angles of a triangle is 5 : 6 : 7 and the measure of the first angle is 50° . Find the measure of each of the other two angles.

2. A fruit seller has three kinds of fruit (banana, grapes and Guava)
   If the ratio between the weight of banana to the weight of grapes is 2 : 3 and the ratio between the weight of grapes to that of guava is 2 : 4 . Find the ratio among the weights of banana, grapes and guava.

3. If the ratio between the heights of three buildings is 3 : 4 : 5 and if the hight of the first building is 12 metres calculate the heights of the second and the third building.

4. If the ratio between the ages of Hoda, Mona and Ola is 2 : 4 : 5 and if the difference between the age of Hoda and that of Mona is 8 years. Calculate the age of each of Hoda, Mona and Ola.
   between

5. The ratio between the length and the width of a rectangle is 9 : 5 . If the perimeter of the rectangle is 56 meters, find out the length and the width of the rectangle, then calculate its area.

6. A triangular piece of land the ratio between the lengths of its side is 4 : 6 : 7 .
   If the perimeter of this piece of land equals 51 meters, find the lengths of the sides of the piece land.

5 *Ratio Applications (Rates)*

What do you learn from this lesson?
Through your active participation you can recognize :
- The meaning of the rate.
- The unit expressing the rate.
- Solving miscellaneous applications on the rate.

Mathematical concept
- The rate.

Notice and Think

Nabeel held a party for his birthday. He invited 6 friends. He distributed 12 pieces of gateaux on 6 plates as 2 pieces for each plate as shown in the opposite figure.

The ratio between 12 pieces of gateaux to 6 plates is written $2 = \frac{12}{6}$ pieces for each plate the ratio

Activity:

If a car covered 180 kilometres within 3 hours then the speed of this car is $\frac{180 \text{ km}}{30 \text{ hours}}$ = 60 km per hour
i.e. The car moves with speed 60 km / hour (which is called the rate)
The ratio 60km / hour is the rate of covered distance per hour and it is written as (60km / hour)

From the previous we deduce that :

The rate is: The ratio between two quantities of different kinds and the unit of rate is the unit of the first quantity per each unit of the second quantity .

Drill (1) Complete the spaces in the following table by writing the suitable rate in front of each statement as in the example:

The statement	The rate	
	Symbolically	Verbally
A car covers 240km in 3 hours	240/ 3 = 80 km/hour	80km per hour
A family spends LE350 in 7 days	....	......LE per day
A secretary lady writes 320 lines within 4 hours	....	.... Line per hour
A tap pours 360 litres of water in an hour	....	Litre per minute ....
A butcher sells 108kg of meat within 9 hours	....	....

Drill (2) A restaurant's owner prepares 80 food meals, all are of the same kind, using 20kg of meat what is the rate of meat needed for preparing one meal. What is the rate of meat needed for preparing 4 meals.

Exercise (1 - 5)

1. Hassan spends LE 45 within three days what is the rate of what Hassan spends per day?
2. A car consumes 20 litres of petrol to cover a distance 250km. Calculate the rate of consumption of the car to petrol.
3. A plough for agricultural land, ploughs 6 feddans within 3 hours.
   Find the rate of work of this plough. If another plough, ploughs 10 fedan within 4 hours. Which of them is better than the other.
4. A computer colour printer prints 12 paper each 4 minutes. Find the rate of work of this printer.
5. If Hazem studies 21 hours weekly, then find the rate of his studying daily.
6. A factory produces 6000 pieces of the soap in $2\frac{1}{2}$ hours, anther factory produces 4500 pieces of the soap in $1\frac{1}{3}$ hours.
   which factory has more production rate ?

General exercises on unit 1

1 Write the ratio between the two numbers in each of the following cases in the simplest form :

(a) 16 and 64 (b) 15 and 105 (c) 16 and 128

2 Write in the simplest form each of the following ratios :

(a) 2.7 : 18.9 (b) $5\ \frac{9}{4}$: 14.5

3 Express in two different ways the ratio between each two numbers:

(a) 14 , 128 (b) 2.4 , 18 (c) 185 , 370

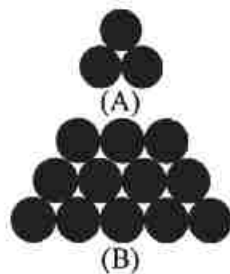
4 Write in the simplest form each of the following cases :

(a) half km : 250 metres (b) 125 piasters : 5 pounds (c) 150 grammes : aquarter of kilogram

(d) 2.25 feddans:16 kirats

5 Calculate : using the opposite two figures :

The ratio between the number of circles in figure. (A) to the number of circles in figure (B)

the ratio between the number of circles in figure (B) to the number of all circles in the two figures (A) and (B) .

6 An accountant in a bank earn LE 2000 as a monthly salary. He spends $\frac{3}{4}$ his salary and saves the remainder. Find :

(a) The ratio between what the accountant spends to his monthly salary.

(b) The ratio between what he saves to his salary.

(c) The ratio between what he spends to what he saves.

7 A factory produces 5000 juice cans in 8 hours find the production rate pre hour.

8 A water tap is leaking 20 litres of water in 5 hours. find the leaking rate of water pre hour. please advise them:

Technological activity

calculating the ratio using excel program

What do you learn from this activity

- Inserting a set of data in Excel cells
- Calculating the ratio between two numbers using the properties of Excel program

Example :

A rectangle, its length = 6cm, its width = 4cm calculate its perimeter and its area, then find :

- The ratio between the length of the rectangle and its width.

Practical steps :

1- Click (start) then select program, then select Micro soft Excel.

2- Write the following data in the curtained cells on the screen of Excel program.

3- To calculate the area of a rectangle, determine the cell F4 and write the following:

(D4 x C4 =) Then click (Enter) to get (24) which is the area of the rectangle as shown in the following figure.

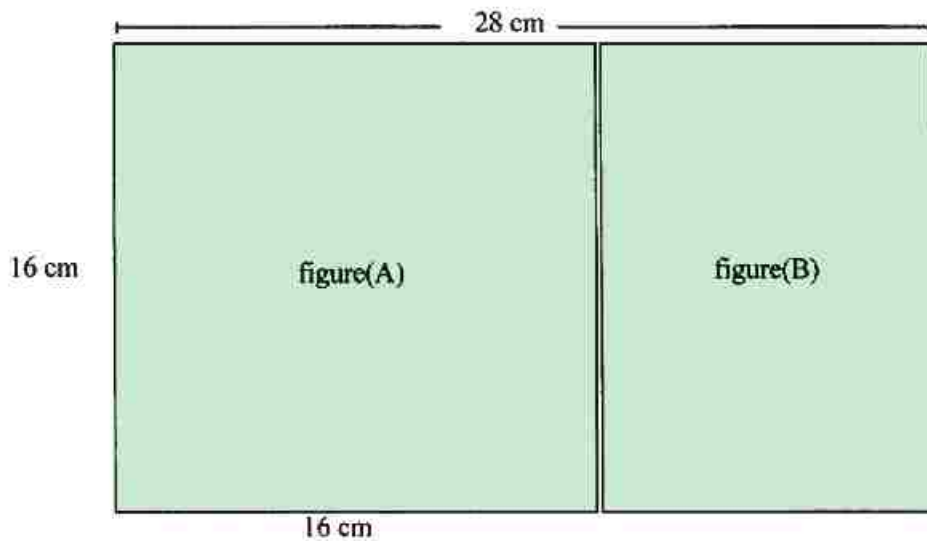
4- To calculate the ratio between the length of the rectangle to its width, determine the two cells D6, C7 and write the following (D4 C4 / =) Then click (Enter) to get (1.5)

Activities:

(1) Cut off a rectangular piece of a card paper with length 28cm and width 16cm shown in the figure.

28 cm

16 cm

figure(A)

figure(B)

16 cm

(a) Calculate the ratio between the length of the piece of paper and its width.

(b) Shears a square from the piece of paper with side length 16cm (figure A), then find :

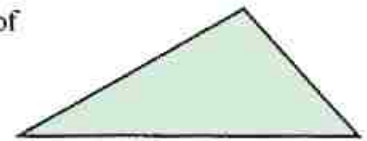
* The ratio between the perimeter of the square (figure A) and the perimeter of the whole paper.
* The ratio between the area of figure (B) and the area of the square (figure A).

(C) Calculate the ratio between the side length of the square and the perimeter of figure (B).

(2) You went to grocery shop and you had LE 30. You asked the grocer about the price of one kg of rice, then he replied : The price is LE 3 . Then you asked him about the price of one kg of sugar, he replied, the price of one kg of sugar $= \frac{3}{4}$ the price of one kg of rice then you bought 2 kg of rice, 4kg of sugar. Calculate each of the following:

* The price of one kg of suger.
* The ratio between the price of one kg of rice to the price of one kg of sugar.
* The ratio between what you paid to as a price of rice to what you paid as a price of sugar.
* The ratio between the remainder with you to what you spent.

(1) In an exam of mathematics in one class the ratio among the weak pupils to those who succeeded to the excellent pupils was 1 : 4 : 1 , If the number of all pupils in the class was 30 pupils. Calculate the number of succeeded pupils and the number of weaked pupils.

(2) The ratio between the lengths of the sides of a triangle is 2 : 3 : 4 . If the perimeter of the triangle is 54 cm, find the length of each side of the triangle.

(3) A ship for transporting goods among the countries. Consummes 25 litres of fuel to cover a distance 15km. Calculate the rate of consumption of fuel.

(4) Complete try getting the ratio in each of the following cases :

* 250 gm : $\frac{1}{2}$ kg = ... : ....

* 16 kirat : 1 feedan = ... : ....

* 2 $\frac{1}{2}$ m : 125 cm = ... : ....

* 8 hours : 3 $\frac{1}{3}$ days = ... : ....

(5) If the ratio between the hight of Khalid to the hight of Ahmed is 2 : 3 and the ratio between the hight of Ahmed to the hight of Hani is 4 : 5. Calculate the ratio between the hight of Khalid to that of Hani.

Unit 2 :

Proportion

1 *The meaning of proportion*

What do you learn from this lesson?
- Through your active participating you will come to:
* The meaning of proportion.
* Writing some forms of proportion.

The mathematical concepts of proportion.

Think and discuss:

If the price of one juice can is LE 2 in one of commerical shops.

What is the price of two cans?, 3 cans , 4 cans ……?

The following table shows the number of cans and the number of pounds representing their prices in each case.

Number of juice cans	1	2	3	4	5	......
The price in LE	2	4	6	8	10	......

(2 × ; ÷2)

It is shown from the table that

First : The number of pounds in each case is produced by multiplying each number of juice cans corresponding to it by 2.

In the first case :

The number of cans = 1 then the number of pounds = 1 × 2 = 2

In the second case 2 × 2 = 4

In the third case 3 × 2 = 6 and so on

we can write the ratio between the number of pounds to the number of juice cans in each case as follows

$\frac{2}{1} = \frac{4}{2} = \frac{6}{3} = \frac{8}{4} = \frac{10}{5}$ =........=2 constant value

We deduce that the ratios are all equal
(This form is called a proportion)

Second

The number of juice cans in each case is produced by dividing the corresponding number of pounds by 2

or multiplying it by $\frac{1}{2}$

We can write the rations between the number of juice cans to the number of pounds in each case as follows = $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$ = …… (constant value)

We deduce that all ratios are equal
this form is called a proportion

From the previous we can define the proportion as follows
The proportion is the equality of two ratios or more.

Drill (1)

If the price of one kg of apple is LE 8

Complete the following table . Then write some of forms of proportion:

× .... (left arrow) ; ÷ .... (right arrow)

The weight of apple in kg	1	2	4		......	8
The price in pounds	8			40	48	

some forms of proportion are .... = ... = ... = ...

Example (1) :

Complete the following table for the numbers in the first column if it is proportional with the corresponding numbers in the second column.

Then write some of forms of proportion

3	2
....	6
6	....
....	12
10	....

$\times \frac{3}{2}$; $\div \frac{3}{2}$

Solution :

To calculate the missed number in the second column in the third and fifth row we multiply the corresponding number to each of them by $\frac{3}{2}$ to be

$6 \times \frac{3}{2} = \frac{6}{2} \times 3 = 3 \times 3 = 9,$

$10 \times \frac{3}{2} = \frac{10}{2} \times 3 = 5 \times 3 = 15$

To calculate the missing number for the first column in the second and the fourth row, we divide the corresponding number to each of them by $\frac{3}{2}$

i.e. multiply $\times \frac{2}{3}$ to be

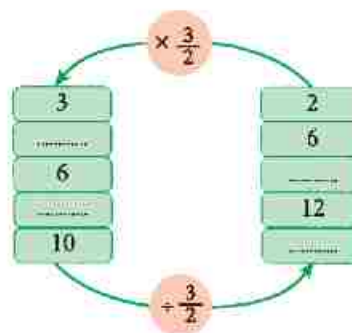
$6 \times \frac{2}{3} = \frac{6}{3} \times 2 = 2 \times 2 = 4$

$12 \times \frac{2}{3} = \frac{12}{3} \times 2 = 2 \times 4 = 8$

After completing the table the proportion will be

$\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12} = \frac{10}{15}$

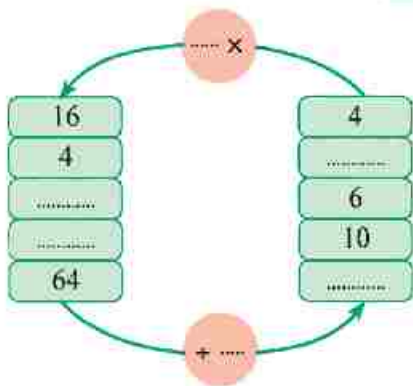
Some form of proportion : $\frac{2}{3} = \frac{4}{6}$

$\frac{2}{3} = \frac{6}{9} = \frac{10}{15}$, $\frac{2}{3} = \frac{4}{6} = \frac{8}{12}$

Drill (2)

Complete the following table for the corresponding numbers if the two rows of the table are proportional, then write some forms of proportion.

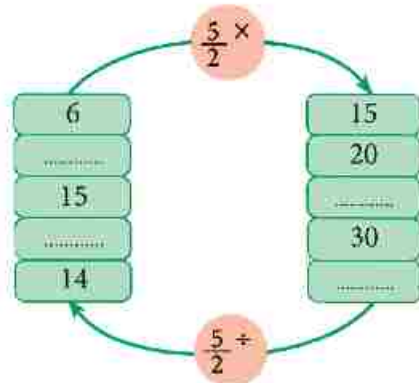
3	6	......	15	......
4	......	12	......	28

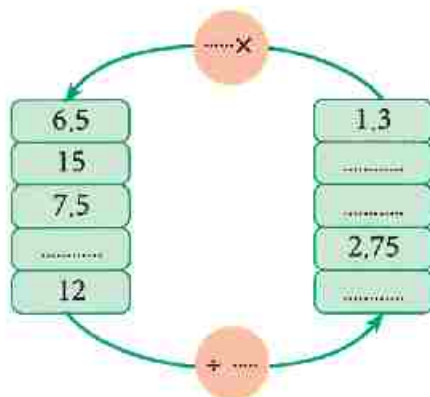
(.....×)

Exercise (2 - 1)

1 Compplete the opposite diagram for the corresponding numbers in the two columns of the table are proportional, then complete the form of proportion below the columns.

$\frac{4}{16} = \frac{.....}{.....} = \frac{.....}{.....} = \frac{.....}{.....} = \frac{.....}{.....}$

2 Complete the opposite diagram for the corresponding numbers in the two columns are proportional then complete the form of proportion below the columns and write some forms of proportion.

$\frac{6}{15} = \frac{.....}{.....} = \frac{.....}{.....} = \frac{.....}{.....} = \frac{.....}{.....}$

3 Complete the opposite diagram for the corresponding numbers in the two columns are proportional, then write some of forms of proportion.

$\frac{.....}{.....} = \frac{.....}{.....} = \frac{.....}{.....} = \frac{.....}{.....} = \frac{.....}{.....}$

2 *Properties of proportion*

What do you learn from this lesson?
Through your active participating you will come to:
- determine the properties of proportion.
- determine the terms of proportion
- determine the two extremes and the two means of any proportion
- find a missed term of proportion using the other given terms

Mathematical concepts
- The terms of proportion
- The extremes
- The means

Notice and think through the following figures :

$\frac{2}{3} = \frac{8}{12}$ $\frac{21}{33} = \frac{7}{11}$

In the first case

We multiply the two terms of the ratio $\frac{2}{3}$ by 4 to get the proportion $\frac{2}{3} = \frac{8}{12}$

In the second case

We divide the two terms of the ratio $\frac{21}{33}$ by 3 to get the proportion $\frac{21}{33} = \frac{7}{11}$

From the previous we deduce the following property.

We can form a proportion if we have a ratio as follows :
- By multiplying the two terms of the ratio by a non – zero number then the resultant ratio is equal to the first one (i.e. we get a proportion)
- Also by dividing the two terms of the given ratio by a non – zero number then the resultant ratio is equal to the first one (i.e. we get a proportion)

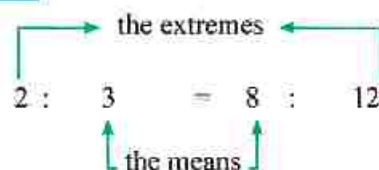
Notice that :

In the first case the proportion : $\frac{2}{3} = \frac{8}{12}$

The numbers 2, 3, 8 and 12 are called proportional numbers.

The terms of proportion is called as shown in the opposite figure.

2	3	8	12
↓	↓	↓	↓
First term	Second term	Third term	Fourth term

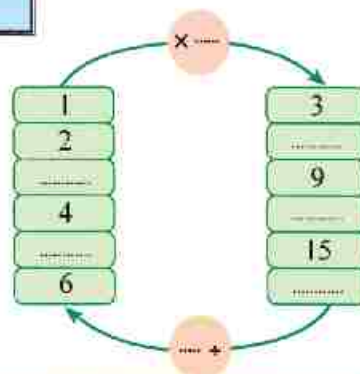
The two terms (2 , 12) are called the extremes and the two numbers (3 , 8) are called the means as shown in the opposite diagram.

Drill (1) Notice and complete the following table as in the example

Proportion	Terms of proportion	Extremes	Means
$\frac{1}{4} = \frac{7}{28}$	1 , 4 , 7 , 28	1 , 28	4 , 7
$\frac{2}{6} = \frac{6}{18}$	2 , ... , ... , ...	2 , ...	6 , ...
$\frac{.....}{.....} = \frac{20}{28}$	5 , 7 , ... , ...	5 , ...	.... , ...

Drill (2)

A library owner sells the colours case for LE 3 complete the opposite diagram of sails.

Then write some of forms of proportion

The proportion is $\frac{.....}{.....} = \frac{.....}{.....} = \frac{.....}{.....} = \frac{.....}{.....} = \frac{.....}{.....}$

Think and deduce

Proportion					
$\frac{3}{5} = \frac{9}{15}$		$\frac{7}{4} = \frac{28}{16}$		$\frac{2}{3} = \frac{24}{36}$	
The product of extremes	The product of means	The product of extremes	The product of means	The product of extremes	The product of means
3 × 15 = 45	**5×9= 45**	**7×16= 112**	**4×28= 112**	**2 × 36 = 72**	**3 ×24 = 72**

Compare between the produce of extremes and the product of means in each proportion and show what you deduce.

You will deduce the following property

If two ratios are equal then

The product of the extremes = the product of the means

Drill (2) Determine which of the following ratios in each case represents a proportion (take the first case as a hint for you).

(1) $\frac{2}{5}$, $\frac{6}{15}$ represents a proportion because

2 x 15 = 30 and 5 x 6 = 30

i.e. The product of the extremes = the product of the means

(2) $\frac{6}{7}$, $\frac{18}{21}$ ……. Because …….. × ……. = …… × …… = …….

i.e. The product of the extremes ………. The product of the means.

(3) $\frac{20}{40}$, $\frac{4}{8}$ ……… because …….. × …… = …….., …….. × ……. = ………..

i.e. The product of the extremes ………. The product of the means.

Example (1) :

Find the missed term denoted by x in the following proportion

$\frac{2}{6} = \frac{10}{x}$

Solution

We can determine the missed term (x) by two methods as follows

First using the correspondence between numbers in rows and columns

(a) by using the correspondence between numbers in rows

First row 2, 10

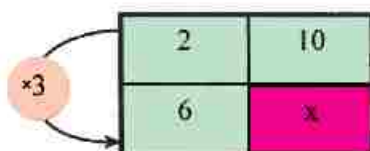
Second row 6 , x

We notice that 2 became 6

i.e. it is multiplied by 3

Therefore multiply 10 by 3 to get

$x = 10 \times 3 = 30$ then the proportion

because $\frac{2}{6} = \frac{10}{30}$

(b) Using the correspondence between the numbers in columns

First column

$\frac{2}{6}$

The second column

We notice that 2 became 10

i.e. it is we multiply 6 by 5 to get $x = 6 \times 5 = 30$ then

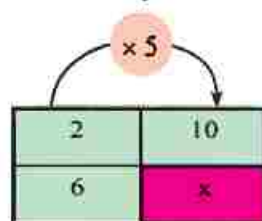
the proportion becomes $\frac{2}{6} = \frac{10}{30}$

Second : by using the property of proportion which is the product of extremes = the product of means

since $\frac{2}{6} = \frac{10}{x}$ Then we get $2 \times x = 6 \times 10$

dividing by 2 for the two sides

$\frac{2 \times x}{2} = \frac{6 \times 10}{2}$ We get $x = \frac{60}{2} = 30$

Then the proportion becomes $\frac{2}{6} = \frac{10}{30}$

Example (2) :

If the numbers 4 , x , 12 , 18 are proportional find the value of x

Solution :

Since the numbers are proportional

Therefore we can put it in the form of a proportion which is

$\frac{4}{x} = \frac{12}{18}$

Using the property of proportion which is the product of the extremes = the product of the means we get

$12 \times x = 18 \times 4$ dividing by 12

$\frac{12 \times x}{12} = \frac{18 \times 4}{12}$ we get $x = \frac{18}{3} = 6$

Then we can write the proportion in the form : $\frac{4}{6} = \frac{12}{18}$

Example (3) :

In a shop for selling juice. 2 kg of orange have been squeezed to get 6 glasses of orange juice to clients If 5 kg of orange have been squeezed, how many glasses of juice will be gotten to offer to clients and how many kg of oranges are needed to get 27 glasses of orange juice to the clients?

Solutions :

Such these type of problems can be solved through representing their data in a table as follows .

The weight in kg	2	5	Y
Number of glasses	6	x	27

First :

We can get the value of x regarding 2 , 6 , 5 and x (4 proportional terms)

Then the proportion is in the form $\frac{2}{6} = \frac{5}{x}$ (from the property of proportion)

$2 \times x = 5 \times 6$ (diving by 2)

$\frac{2 \times x}{2} = \frac{5 \times 6}{2}$ then we get $x = \frac{30}{2} = 15$ glasses and the proportion is in the form

$\frac{2}{6} = \frac{5}{15}$

Second :

We can get the value of y regarding 2 , 6 , y , 27 are four proportional terms therefore the proportion is $\frac{2}{6} = \frac{y}{27}$ (from the property of proportion)

Then $6 \times y = 2 \times 27$ dividing by 6

$\frac{6 \times y}{6} = \frac{2 \times 27}{6}$ we get $y = \frac{2 \times 27}{6}$ = 9kg of orange

the proportion is in the form $\frac{2}{6} = \frac{9}{27}$

Exercise (2 - 2)

1 Find x in each of the following proportions

(a) $\frac{5}{8} = \frac{15}{x}$ (b) $\frac{x}{6} = \frac{20}{30}$

2 Find the missed number (x) for the following numbers to be proportional 6, 8 , 3 , x

3 Ali bought 5 kg of orange, he paid LE 15 . How much money does he pay to buy 8 kg?

4 A car consumms 20 litre of Benzin for covering 210 km, How many litre of Benzin does the car consumm to cover 630 km.

5 The ratio between Hany's weight to the weight of his father = 3 :5 what is Hany's weight if the weight of his father is 90kg.

6 A primary school, its building height is 14 metre and the shade of this building at a certian moment is 5m length. What is the height of a tree in the same moment if its shade length is 3 metres ?

3 *Drawing Scale*

What do you learn from this lesson?
Through your active participation you will come to:
- the meaning of drawing scale
- how to calculate the drawing scale in different cases
- the relation between minimizium and enlargement with drawing scale
- how to calculate the real length of a thing
- how to calculate the drawing length of a thing.

Mathematical concept
- the real length
- the drawing length
- the drawing scale
- minimization
- enlargement

The meaning of drawing scale

Think and discuss

Khalid made a party for his birthday. During the party, some photo – pictures were taken to him and his companies. After wards, Khalid measured his length in the picture to be 15cm, while the real length is 150cm that means that 15cm in the picture represents 150cm in reality.

i.e. the ratio between the length of Khalid in the picture to his real length is

15 : 150 = 1 : 10

i.e. each one cm in the picture represents 10cm in reality.

That means that

$$\frac{\text{The length of Khalid in the picture}}{\text{The real length of Khalid}} = \frac{15}{150} = \frac{1}{10}$$

This ratio is called (the drawing scale)

$$\text{i.e. the drawing scale} = \frac{\text{The drawing length}}{\text{The real length}}$$

Example (1) :

An engineering design for a villa is made. If the height of the fence of the villa in the design is 5cm and its real height is 3 metres find the drawing scale.

Solution :

We should convert the two heights to the same unit.

The height of the fence in the picture = 5 cm

the real height of the fence = 3m = 3 × 100 = 300cm

The drawing scale = the drawing length ÷ the real length = $\frac{5}{300} = \frac{1}{60}$

That means that each 1cm in the drawing represents 60cm in reality.

Example (2) :

Adel took a magnified picture with a camera.

If the length of an insect in the picture is 10cm and its real length is 2mm.

Find the drawing scale.

Solution :

We should convert the two lengths to the same length unit

The real length of the insect = 2mm

The length in the drawing = 10cm × 10 = 100mm

The drawing scale $\frac{\text{The drawing length}}{\text{The real length}} = \frac{100}{2} = \frac{50}{1}$

This means that each 50mm in the drawing represent 1mm in reality.

Remark :

Now we have a drawing scale less than one which is $\frac{1}{10}$ as in the case of the picture of Khalid and $\frac{1}{60}$ as in the design of the villa. And we have a drawing scale greater than one which is (50 : 1) as in the case of the magnified picture of the insect.

We deduce that :

* If (The drawing scale < 1) this expresses minimization as in the designs of engineering establishments – Maps of countries – pictures of persons or places. ..... etc.
* If (the drawing scale > 1) this expresses enlargement as in the case of the picture of the insect – magnifying the picture of a person ...... etc.

Example (3)

If the drawing scale which is registered on a map of some inhabitant's cities is 1 : 500000 and if the distance between two cities on this map is 3cm . Find the real distance between them.

Solution :

Since the drawing scale = $\frac{\text{The length in the drawing}}{\text{The length in reality}}$

That means : $\frac{1}{500000} = \frac{3}{\text{The length in reality}}$

And from the property of proportion

The product of the extremes = The product of the means

We get

The length in reality x 1 = 3x500 000

The length in reality = 1500 000

And converting the answer into Km

We get

The length in reality = $\frac{1500000}{100000}$ = 15 km

Drill

In a mapping picture for some cities is drawn by a drawing scale 1 : 400 000. If the real distance between two cities is 46 km Find the distance between them on the map

We notice from the previous that

The problems which are connected with the drawing scale are determined in three kinds they are:-

First kind:- Calculating the drawing scale

(as in examples 1, 2)

Second kind:- Calculating the real length

(as in examples 3)

Third kind :- Calculating The drawing length

(as in The drill)

Exercise (2 - 3)

1 A picture of a building is taken with a drawing scale of 1 : 1000. If the height of the building in the picture is 3 cm, what is its real height?

2 Ahmed draw a picture to his brother Osama with a drawing scale 1 : 40. If the real hight of Osama is 160 cm, What is his hight in the picture?

3 A magnified picture of an insect was taken with enlargement ratio100:1 If the length of the insect on the picture is 2.5 cm

What is the real length of the insect?

4 If the distance between two cities on a map is 3 cm, and the real distance between them is 9 km. Find the drawing scale of the map Then

If the distance between two cities on the same map is 5 cm. calculate the real distance between the two cities.

5 Complete the following table.

Description of the case	Drawing scale	Drawing length	Real length	enlargement minimization
The distance between two squares on a map of a town	1:50000	2cm	....	....
The length of a playground of apicture of sport playgrounds	1:3600	....	12 m	....
The height of a house on a picture of a quarter	....	3cm	18m	....

6 Arctangular piece of Land of area 1200m² it is drawin adrawing scale 1:200,if its length in drawing is 20 cm find:

(a) the real length of the hand

(b) the real width of the hand

7 If the length of the suez canal on amap of drawing scale 1:1100000 is 15cm find its read lenth in kilomters.

4 The proportional division

What do you learn from this lesson?
Through your active participation you will come to:
- The meaning of proportional division
- How to carry out the operation of proportional division
- Solving miscellaneous applications on proportional division

Mathematical concept
-proportional division

The meaning of proportional division

Read and think Then discuss Through the following examples

Example 1

A father distributed LE 600 between his sons Maged and Ramez at the begining of The school year to buy the school uniform in ratio 5:7

What is the share of one of them?

Solution

Magid's share : Ramez's Share

5 : 7

i.e the Sum of parts of distributing the sum $= 5 + 7 = 12$ parts

i.e The value of each part $= \frac{600}{12} =$ LE 50

Magid's Share $= 5 \times 50 =$ LE 250

Ramez Share $= 7 \times 50 =$ LE 350

> **Notice That : In this example The sum of money is distributed by a given ratio 5 : 7 between two persons.**
> **Such as this division called proportional division**

Example 2

A man died and left a piece of lend for building, its area is 17 kirats.

We recommended for building on orphan house on area equals 5 kirats. The remainder is distributed between his son and his daughter in the ratio 2:1. Calculate the share of each of them from the land.

Solution

The remainder $= 17 - 5 = 12$ kirat

The son's share : The daughter's share

2 : 1

i.e the Sum of parts in which the remained land will be distributed = 3 parts

that means12 kirat equal 3 parts

i.e the value of each part = $\frac{12}{3}$ =4 kirats

The son's share = 4 × 2 = 8 kirats

The daughter's share = 4×1 = 4 kirats

Notice that in this example, the area of the land has been distributed by a give ratio 2:1

Such as this division is called proportional division.

From the previous we deduce that

The proportional division

Is dividing a thing (money, lands, weights, ...)

With a given ratio

Example 3

The number of pupils in the grades four, five, and six) in a primary school is 399 pupils If the number of the pupils of the fourth grade .Equals $\frac{4}{3}$ the number of pupils of the fifth grade and the number of pupils of the fifth grade equals $\frac{6}{5}$ the number of pupils of the sixth grade calculate the number of pupils of each grade.

Solution

The problem will be solved by getting the ratio among the three grades.

Using the idea of L.C.M of (3 and 6) which is 6 w will get that the sum of parts = 8 + 6 + 5 = 19 parts

4 th grade	:	5 th grade	:	six th grade
4		3		
		6	:	5
8	:	6	:	5

That means that 399 pupils equate 19 parts

i.e The value of each part = 399 ÷ 19 = 21 pupils

The number of pupils of fourth grade = 8 x 21 = 168 pupils

The number of pupils of fifth grade = 6 x 21 = 126 pupils

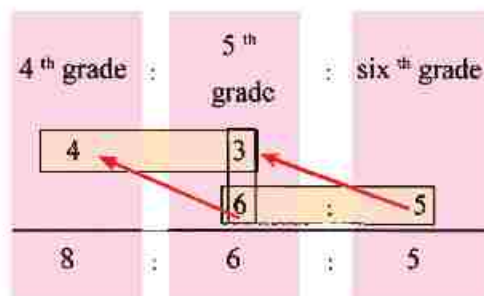
The number of pupils of fourth grade = 5 x 21 = 105 pupils

Notice that solution is carried out by the idea of L. C. M to get the ratio among three numbers and the solution is completed as previous.

verifying the truth of the solution

You can check the truth of your solution as follows

$$\frac{\text{The number of pupils of 4}^{th}\text{ grade}}{\text{The number of pupils of 5}^{th}\text{ grade}} = \frac{168}{126} = \frac{84}{63} = \frac{12}{9} = \frac{4}{3}$$

$$\frac{\text{The number of pupils of 5}^{th}\text{ grade}}{\text{The number of pupils of 6}^{th}\text{ grade}} = \frac{126}{105} = \frac{6}{5}$$

Example 4

Three persons participated in a commercial (project) with capital LE 60000.

The first paid LE 15000, The second paid LE 25000 and the third paid LE 20000 At the end of the year, the profit was LE 5520 Calculate the share of each of them.

Solution

What the 1st paid		what the 2nd paid	:	what the 3rd paid
15000	:	25000	:	20000
15	:	25	:	20
3	:	5	:	4

The sum of parts = 3 + 5 + 4 = 12 parts

That means that

LE 5520 equate 12 parts

The value of each part = $\frac{5520}{12}$ = LE 460

The share of the First = 3 × 460 = LE 1380

The share of the second = 5 × 460 = LE 2300

The share of the Third = 4×460 = LE 1840

Notice That in such as these problems the profits are distributed by the ratio among the paid money

In the project

Verifying the truth of the solution

You can check the truth of the solution as follows

The share of the first	:	The share of The second	:	the share of the third	
1380	:	2300	:	1840	(dividing by 10)
138	:	230	:	184	(dividing by 23)
6	:	10	:	8	(dividing by 2)
3	:	5	:	4	

This are the some ratio among. The paid money by each person

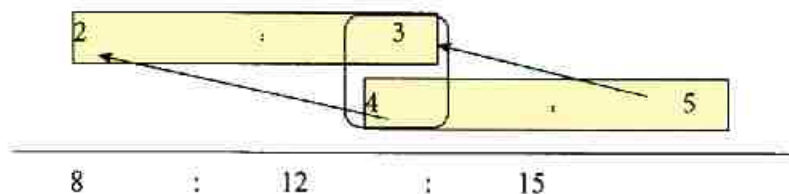
Example 5

A load of apple fruit weighs 280 kg. is distributed among three merchants .

The share of the first = $\frac{2}{3}$ the share of the second and the share of the second = $\frac{4}{5}$ the share of the third.

Calculate the share of each of them from this load.

Solution

The share of the 1st The share of the 2nd the share of the 3 rd

Notice that (L.C.M) of (3,4) is 12 therefore

The sum of parts = 8 + 12 + 15 = 35 parts

That means

280 kg equate 35 parts

I.e The value of each part = $\frac{280}{35}$ =8kg

The share of the first = 8 x 8 = 64 kg.

The share of the second = 12 x 8 = 96 kg

The share of the third = 15 x 8 = 120 kg

Verifying the truth of the of solution you can check the truth of the solution as follows .

The share of the first	:	the share of the second	
64	:	96	(divided by 2)
32	:	48	(dividing by 16)
2	:	3	

This is the given ratio.

The share of the second	:	the share of the third	
96	:	120	(dividing by 2)
48	:	60	(dividing by 12)
4	:	5	

This is the given ratio.

Drill

Hoda, Mona and Thanaa participated in a commerce. Hoda paid LE 1500, Mona paid LE 2000 and Thanaa paid LE 2500. At the end of the year the loss of the company was LE 1200 Find the share of each of them from loss.

Exercise (2 - 4)

1 A piece of building land is distributed between two brothers in the ratio 7:5 . If the share of the first one exceeds the share of the second by 80 square metre. Find the area of the land and the share of each of the first and the second.

2 The number of pupils of a primary school in the 1st, the 2nd and the 3rd grades is 240 pupils. If the ratio among the three grades is 5 : 4 : 3.
Calculate the number of pupils in each grade.

3 A father distributes LE 225 among his three sons. The share of the first was third of the sum and the ratio between the share of the second and the share of the third was 2:3. Find the share of each them.

4 for solving the illiteracy problem at a village, 3 classes have been opened for solving this problem, the number of learners was 92 Person.
If the number of learner in the 1st class = $\frac{2}{3}$ the number of learners in the 2nd class
and the number of learners in the 2nd class . = $\frac{5}{7}$ the number of learners in the 3rd class.
Find the number of learners in eash class .

5 In one of our schools, there are 560 students, if the number of girls = $\frac{3}{5}$ the number of boys find each of the number of boys and girls?

5 *Percentage*

What do you learn from this lesson?

Through your active participation you you will come to:

The meaning of percentage

- How to calculate the percentage of a thing .
- Converting the percentage to a fraction.
- converting a fraction to a percentage.
- solving life problems on parentage.

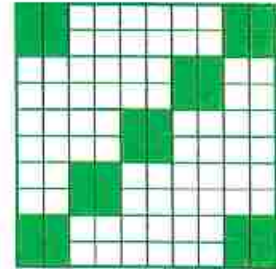
Mathematical concept

-The percentage

Notice and think

The apposite figure represents a big square divided into 100 small squares, all of them are equal in side length.

The ratio between the shaded part by green calour to the big square = $\frac{28}{100}$ or 28 : 100

Notice that the first term in this ratio is 28 and the second term of the ratio is 100 such as this ratio is called a percentage and it is written in the form 28 % and it is read 28 percent.

From the previous we deduce that

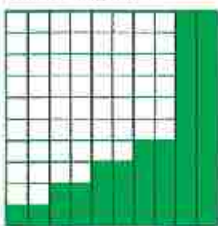
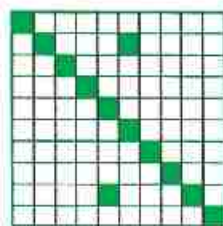
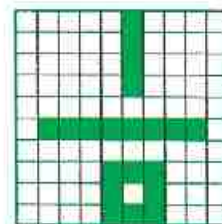
The percentage is a ratio its second term is 100 and it is denoted by %

Notice from the figure that

The ratio of the unshaded part = 72 % and it is read as 72 percent

The ratio of the shaded part and the unshaded part 28 % +72 % =100 %

Drill

Write the percentage which expresses the shaded part and that which represents the unshaded part below each figure

- The percentage of the Shaded part = ...
The percentage of the unshaded part =...

The percentage of the shaded part = ...
The percentage of the unshaded part =...

The percentage of the shaded part = ...
The percentage of the unshaded part = ...

Remarks from life

- When you enter a bank or post office and you read the statement.

The interest of the saving card is 10 % in the year.

That means that each LE 100 has an interest or profit = LE 10 so the total amount = EL 110. That because the interest (10LEfor each LE 100) is calculated as follows $\frac{10}{100} \times 100 =$ LE 10 which is add to the sum LE 100.

- When you read the statement (The percentage of the discount is 30%) in a commercial shop. That means that.

Each LE 100 has a discount = LE 30 and you pay to the shop LE 70 only That because the percentage of discount (30LE for each LE 100) is calculated as follows .

$\frac{30}{100} \times 100 =$ LE 30 which is discounted from each LE 100 as paying

- When you read on a piece of clothes the following statement (the ingradients 45 % wool, 25 % cotton30 % synthetic) that means that the sum of all these ingradients = 45 % + 25 % + 30 % = 100 %

Remark

100 % of amount = The all amount.

It means $\frac{100}{100}$ from the amount

= the total unit of the amount

i.e the total amount.

i.e the total amount.

Drill (1)

Explain the meaning of the following statements

- The discount on purchases 22%
- The interest on saving money = 9.5%
- The ingredients 100 % Cotton
- The ingredients 55% wool and the remainder is synthetic

Drill (2)

Calculate the paid money for the following purchases in a company.

Which offer discounts or its sails

1- A shirt, its price is LE 65 and the discount is 15 %.

2- An Iron, its price is LE 120 and the discount is 20%

3- A computer, its price is LE 2700 and the discount is 9%.

Converting a percentage into a common fraction or a decimal.

Example 1

In a class the number of bogs was 35% from the total number of pupils .

- What is the percentage of girls?
- Convert each of the previous percentage into a common fraction them to a decimal.

Solution

- The percentage of girls = 100% - 35% = 65%
- Converting the percentage into to a common fraction

The percentage of bays is 35% = $\frac{35}{100} = \frac{7}{20}$ (common fraction)

The percentage of girls is 65% = $\frac{65}{100} = \frac{13}{20}$ (common fraction)

- Converting the percentage into a decimal

The percentage of boys is 35% = $\frac{35}{100}$ = 0. 35 (a decimal)

The percentage of girls is 65 % = $\frac{65}{100}$ = 0. 65 (a decimal)

Drill (3)

An agricultural piece of land. The cultivated part of it by vegetable is 40%

Convert this percentage to common fraction and to decimal.

Converting a common fraction or a decimal into percentage)

Example2

In a village the ratio between the not educated people to those who are educated is 4 : 25

Write this ratio in the form of a percentage

Solution

4:25 is equivalent to $\frac{4}{25}$

To convert $\frac{4}{25}$ to a percentage we should make the second term in this ratio = 100 This will be multiplying the two terms by 4 .

i.c $\frac{4}{25} = \frac{4}{25} x \frac{4}{4} = \frac{16}{100}$ i.e 16%

Drill (4)

Convert each of the following Common fractions into percentage as the first case

a) $\frac{3}{4}$ b) 0.12 c) 0.625

Solution

$\frac{3}{4} = \frac{3}{4} x \frac{25}{25} = 75\ \%$

b) 0.12 = $\frac{.....}{....}$. = ...%

c) 0.625 = $\frac{625}{1000}$ x $\frac{......}{....}$.

= $\frac{......}{....}$x $\frac{......}{....}$= ....%

Remark

To convert the common fraction into percentage we try to make the denominator = 100

This will be done by dividing the fraction by 100 and multiplying it by 100

- to convert the decimal into percentage we convert it to a common fraction and do what we did before

Example 3

In an English exam, Adel scored 13 marks from 20 marks find the percentage of the scored mark of Adel in English.

Solution

The mark of Adel in the exam = $\frac{13}{20}$

The percentage of Adel's mark = $\frac{13}{20} x \frac{5}{5} = \frac{65}{100} = 65\%$

Exercise (2 - 5)

1 In a school trip, 12 pupils from 25 pupils in a class have participated in finding the percentage of the participant pupils.

2 Complete the following table as in the example

The fraction	The percentage	The symbol	Verbal expression
0. 75	$\frac{75}{100}$	75%	75 precent
0.06	....	....	6 precent
....	....	40%	....
$\frac{11}{25}$	....	....	

3 Magid bought a T- shirt, labelled on a small card on it (made of cotton and synthetic). The percentage of the synthetic 40 % only calculate the percentage of cotton then find the equivalent fraction to each percentage.

4 If the percentage of the number of girls in a class which is mixed is 67% find the percentage of the number of boys in this class.

5 In a conditioned carriage in a train the number of occupied seats is 48 seats if the number of seats of the carriage is 60 seats . calculate.

a) The percentage of the occupied seats.

b) The percentage of the empty seats related to the number of occupied seats.

6 Applications on the percentage

What do you learn from this lesson?
Through your active participating you will come to:
How to calculate the interest, discount, given the percentage of each of them.
How to calculate the percentage of the profit or loss given the value of each of them.
How to calculate the selling price givem the buying price and the percentage of profit or loss how to calculate the buying price given the selling price and the percentage of profit or loss.

Mathematic concerts
- The interest, discount.
- The profit, the loss
- The selling price-
-The buying price
- The percentage of increase or decrease.

First: Calculating the interest or discount.

Example 1

Sara deposit LE 9000 in a bank.
The percentage of interest is 11% per year.
What is the amount of this sum after one year.

Solution

The deposit sum = LE 9000

the interest = $\frac{11}{100}$ x 9000 = LE 990

The amount of the sum after one year = the sum + the interest
= 9000 + 990 = 9990 pounds

Example 2

In one of commercial shops the percentage of the discount on sails is 20%. If Ahmed bought a trousers,
The price written on it was LE 80 find what Ahmed paid after the discount.

Solution

The essential price of the trousers = LE 80

The discount = $\frac{20}{100}$ x 80 = LE 16

What Ahmed paid = The essential price – The discount
= 80 – 16 = LE 64

Drill (1)

In one of commercial shops, the milk box is bought for LE 10. If you bought two boxes there would be a discount = 15 % for every two boxes. Calculate the buying price of 6 boxes of milk .
Is the saved money enough to buy any boxes of milk ?

Second

Calculating the percentage of profit or loss

Important remarks

- The profit means = Selling price – (buying price + costs)
- The loss means = (buying price + other costs) – selling price

Example 3

Auto fair owner bought a car for LE 45000 Then he spent LE 5000 for repairing it Then he sold it for 55000 pounds Calculate the percentage of profit.

Solution

The original price of the car = LE 45000

The Costs of repairing it = LE 5000

The profit after selling = The selling price

- (The baying price + Cost price)

= 55000 – (45000 + 5000)

= 55000 – 50000 = LE 5000

The Percentage of the profit $= \frac{5000}{50000} = \frac{5}{50} = \frac{10}{100} = 10\ \%$

Example 4

A fruit seller bought a load of fruit for LE 20000 After buying it he found a bad part of it because of miss – shopping.

He bought the remainder for LE 18000 find the percentage of his loss.

Solution

The original price of fruit = LE 20000

The selling price = LE 18000

i.e the loss = 20000 – 18000 = 2000 pounds

the percentage of loss $= \frac{2000}{20000} = \frac{1}{10} \times \frac{100}{100}$

$= 10\ \%$

Third :- Calculating the selling price and the buying price

Example 5

Find the buying price of goods sold for LE 21520 and the percentage of profit is 15% and find the profit.

Solution

Buying price	profit	selling price
100	15	115 (number of parts)
?	?	21520 (values in pounds)

Since the buying price = $\frac{100}{115}$ x the selling price

$\frac{100}{115} \times 21520 \simeq$ LE 18 713

The profit = selling price – buying price

= 21520 – 18713 = LE 2807

Drill (2)

complete the following table.

The kind	Buying price	Selling price	profit	Percentage of profit
TV	1800	2000	....	....
Refregerator	2400	....	....	12%
Washing maching	....	3100	175	....

Drill (3)

Heba bought an electric sweeping machine for LE 220, if the discount is 15% Calculate the original price of the sweeping machine before discount.

Drill (4) Complete the following table.

The original price	Percentage of discount	Discount	The price after discount
560	10%	....	....
....	15%	45	....
....	....	32	192

Exercise (2 - 6)

1. Calculate the paid value in each of the following purchases in a company which offers discounts on its sales:

   1- A shirt with price LE 65 at 15% discount.

   2- An iron with price LE 120 at 20% discount.

   3- A computer with price LE 2700 at 9% discount.

2. Khaled bought a flat for LE 150000. He sold it at 5% loss. calculate the selling price of the flat.

3. In a shop, the original price of a blouse was LE 120 and the original price of a dress was LE 350. Hoda bought them at 15% discount. calculate what Hoda paid after discount.

4. A merchant bought a quantity of frozen meat for LE 200000. After buying it, he found that a part of it was expired due to bad storing. He sold the rest for LE 180000. Find the percent of loss.

5. If the cost price of a set of electric appliances is LE 72000 and it is sold at 12% profit, calculate the selling price.

General exercises on unit 2

1 Complete the following table for the corresponding numbers in the two rows of the table are proportional. Then write some form of this proportion.

2	5	......	8	......
12	......	36	......	60

...... (top to bottom: ......) ...... (bottom to top: ......)

2 Find the number x in each of the following cases

a) $\frac{2}{7} = \frac{8}{x}$

b) If the numbers 9, 21, 3 and x are proportional

c) $\frac{x}{9} = 15\ \%$ d) $\frac{x + 18}{9} = 8$

3 If the distance between two cities on a map is 10 cm, the real distance between them is 120 km. Find the drawing scale of the map. And if the distance between two other cities on the same map is 6 cm calculate the real distance between them.

4 A picture was take to an artificial scene with a drawing scale 1:100.
If the real length of a tree is 8 meter find its length in the picture.

5 two persons started a commercial business the first paid LE 5000 and the second paid LE 8000. At the end of the year the profit was lE 3900. Calculate the share of each of them from the profit .

6 A company for selling the electric sets It shows T.V for LE 2100. If the percentage of the profit is 12 % find the buying price of t.v

A technological activity

The subject of the activity

Converting the decimal to a percentage using Excel programme.

What do you learn from this activity?

- Open Excel programme through the computer.
- Enserting data through Excel programme.
- Converting the decimal into a percentage using the properties of Excel programme

An example:-

Convert each of the following decimals into a percentage

(a) 0.26 (b) 0.058.

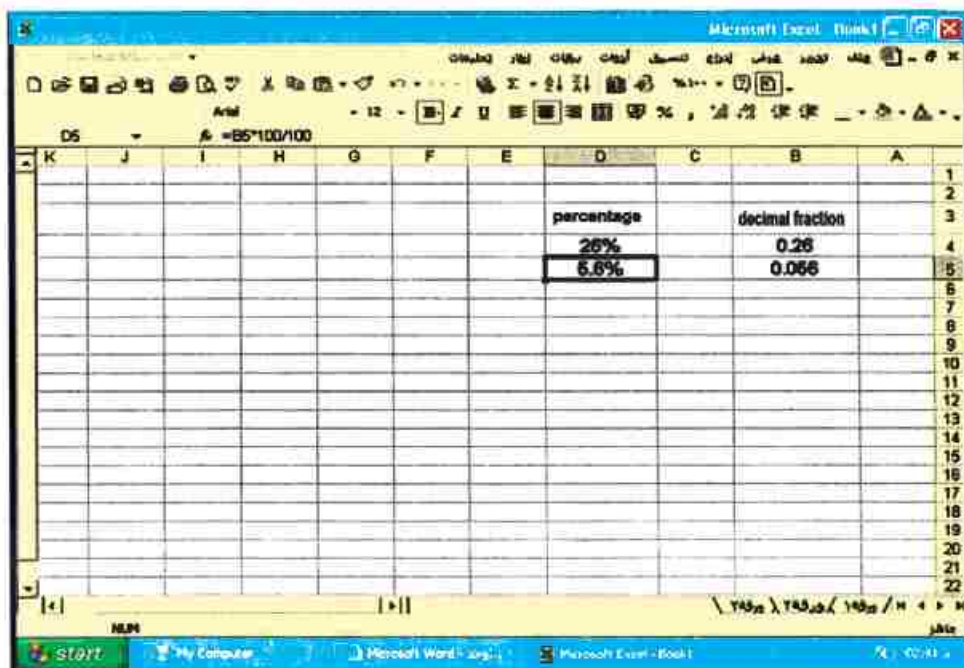
Practical procedure.

1- Click (start) then select program them select Microsoft Excel.

2- write the following data in the determined cells on the screen of the program as in the flowing figure .

3- To Calculate the percentage of the decimal (0.26) determine the cell D 4 and write the following (100/ B4 100=)

Then click (Enter) then the result will appeor to 26 %

To Calculator the percentage of the decimal 0.085, determine the cell D5 and write the following (100 / B5 x 100 =) then click (Enter) to appeor the result (5.6%) as show in the following figure.

1- A triangular garden in a school the ratio between its sides lengths is 3:4:5. If the perimeter of the garden is 120 meter. Calculate the lengths of the sides of the garden.

2- Hani travelled with his father from Cairo to Esmaellia. He has a map for Egyptian governorates. His father asked him to measure the distance between the two governorates on the map he found it 1.3cm then he asked the driver about the real distance between the two governorates, he replied 130 km.

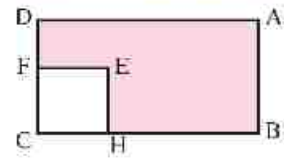
Calculate the drawing scale of the map which is with Hani.

3- The opposite figure ABCD is a rectangle in which AB = 8 cm, CHEF is a square of side length 6 cm. If $\frac{CH}{HB} = \frac{2}{3}$ find :

(a) the length of AD

(b) A perimeter shaded part of the figure

(c) the ratio between the area of the square to the area of the rectangie

(d) Area of the sbaded part (use more than one way).

4- Apicture of a butterfly its length of 42mm. has been enlarged so that become a length Xm.m,width 6,3m.m

find

The magnifying ratio, the valueofx in cm .

The test of the unit

1- Find the missed number (x) if the numbers 3, 4, 9, x are proportional

2- Write in the form of a common fraction in its simplest form each of the following.

33% , 12.5 % , 75 %

3- The number of pupils of grades first, second and third in a primary school is 480 pupils If the ratio among the number of pupils in the first grade to those of second grade to those of the third garde is 6 : 5 : 4

Calculate the number of pupils in each grade.

4- Nahed bought an automatic washing machine for LE 3600 and the discount was 10% Calculate the original price of the washing marchine. Before discount .

5- An edifice of height 12 meters. It's shade at a momoment was 4 meters. What is the height of a tree neighboured to the edifice if its shade = 2 meter long at the same moment.

6- Hani, khaled and Fady shared a commercial business, Hani, paid LE 30000, Khaled paid LE 40000 and Fady paid LE 5000.

At the end of the year the loss was 5000 pounds find the share of them from the loss.

7- A shop keeper for electric sets sold a refrigerator for LE 3180 If the percentage of his profit is 6% find the baying price.

Unit 3 :

Geometry and measurement

Lesson (1) : **The relations between the geometrical shapes**

Lesson (2) : **The Visual patterns**

Lesson (3) : **Volumes**

Lesson (4) : **The volume of the cuboids**

Lesson (5) : **The volume of the cube**

Lesson (6) : **Capacity**

- **General exercises on unit 3**
- **Technological activity**
- **Activities on unit 3**
- **Unit test**

1 The relations between the geometrical shapes

What do you learn from this lesson?

Through your active participation you will come to:-

- deducing the properties of the parallelogram .
- the relation between the parallelogram and each of the rectangle, the square and the rhombus.
- Solving miscellaneous applications using the properties of the geometric shapes and the relations between them.

Mathematical Concepts

The two consecutive angles in the parallelogram.

Activity 1

Notice and deduce

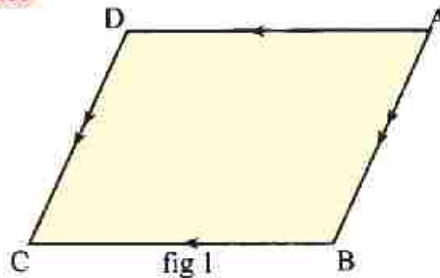



fig 1

In the fig 1

ABCD is a parallelogram that means

$\overline{AB} // \overline{DC}$, $\overline{AD} // \overline{BC}$

First:-

Using the geometric tools in fig 1 Check that

1- AB = DC, AD = BC

2- m (∠A) = m (∠C)

m (∠B) = m (∠D)

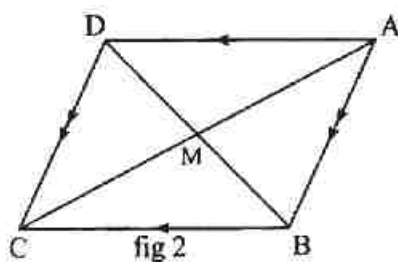
3- m(∠A) + m (∠B) = 180°

m (∠B) + m (∠C) = 180°

fig 2

Second:-

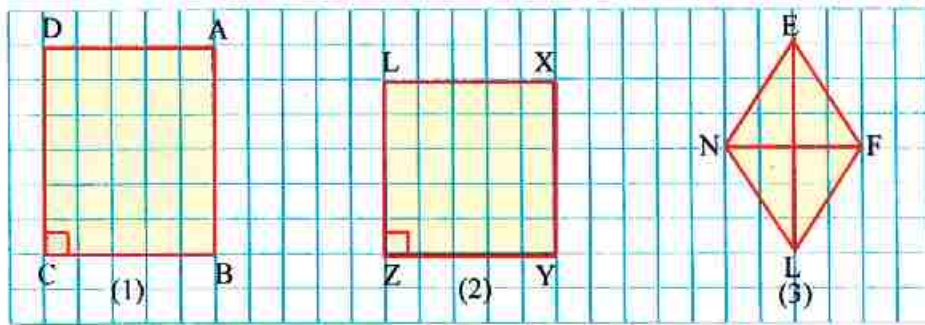
Using the geometric tools in fig (2) Check that

AM = CM , BM = DM

From first and second we deduce that

The parallelogram is a quadrilateral in which :-

- Each two opposite sides are parallel and equal in length .
- Each two opposite angles are equal in measure .
- the sum of the measures of any two consecutive angles equals 180° .
- The two diagonals bisect each other.

Drill 1

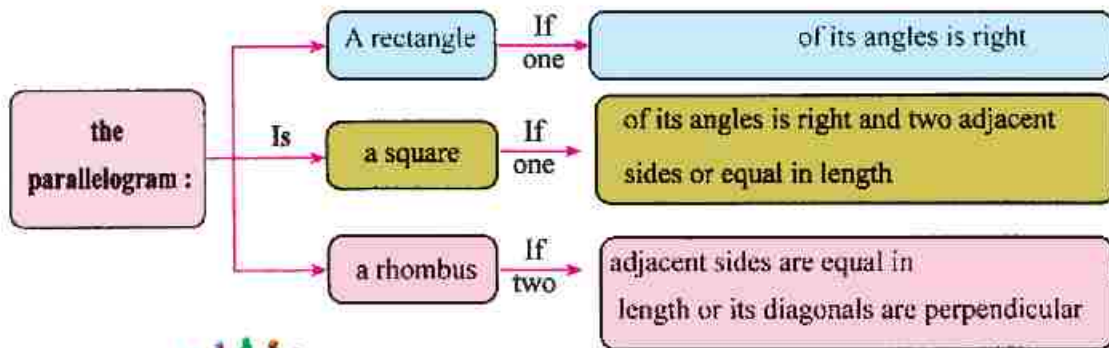
Study the figures on the square lattice then complete and deduce

ABCD is a rectangle
In which
$\overline{AD}$ // ......
$\overline{AB}$ // ......

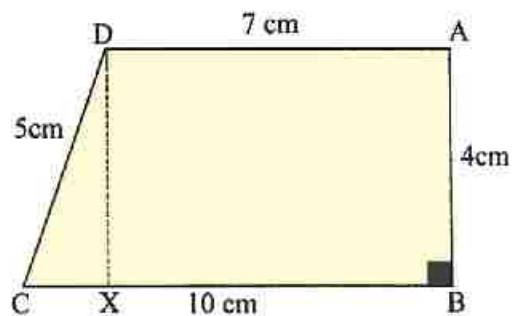
X YZL is
a square in
which
$\overline{XL}$ // .....
$\overline{XY}$ // ....

EFLN is
A rhombus in which
$\overline{EF}$ // ....
$\overline{FL}$ // ....

From the cases 1 , 2 and 3
we deduce that

Each of the rectangle, the square and the rhombus is a parallelogram.

We can summarize that is the following sketch of concepts.

Drill 2

Discus with your group
The opposite figure
ABCD is a trapezium in which m $(\angle B) = 90^\circ$,
AD = 7 cm , AB = 4cm
BC = 10 cm , DC = 5 cm
Locate the point X on $\overline{BC}$ for the figure ABXD is a rectangle In this case there will be

AB = ... = ... cm , AD = ... = ... cm
then the perimeter of $\triangle$ DxC = ... cm

Example 1

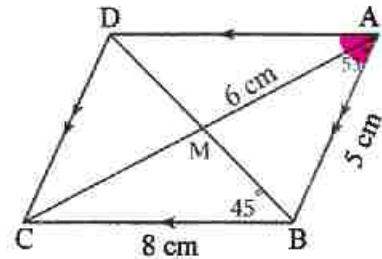
In the opposite figure m ($\angle$A) = 53°, m ($\angle$D BC) = 45°
AM = 6 cm, AB = 5 cm, BC = 8 cm

Calculate without using measuring tools each of

1- m ($\angle$ ABD)

2- m ($\angle$D)

3- AC

4- AD , DC using the properties of the parallelogram.

Solution

The first required:-

Finding m ($\angle$ ABD)

Since m ($\angle$A) + m ($\angle$B) = 180° (two consecutive angles)

Then m ($\angle$ABD) = 180°- (53°+ 45°) =82°

The second required.

M ($\angle$D) = m ($\angle$B) (two opposite angles)

The m ($\angle$D) = 82°+ 45°= 127°

The third required

AC = AM + CM = 6 + 6 = 12 cm

(The two diagonals bisects each other)

The foorth required

AD = BC = 8 cm (The two opposite sides are equal in length)

DC = AB = 5cm

Drill 2 **In the opposite figure**

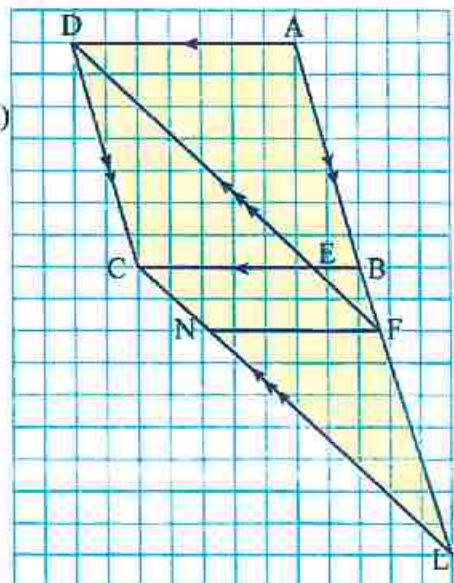
$\overline{AD} \parallel \overline{BC}$, $\overline{AB} \parallel \overline{DC}$

$\overline{DF} \parallel \overline{CL}$

Name and write 3 parallelograms

In the figure

Name and write 3 trapeziums in the figure

Name and write 3 triangles in the figure

Exercise (3 - 1)

1 **complete the following due to what you studied about the properties of quadratic geometric shapes**

a) The four sides are equal in length in each of .... , ...

b) The two diagonals are equal in length in each of ...., ...

c) The two diagonals are perpendicular in each of ...... ,......

d) The four angles are right in each of ..... , ...

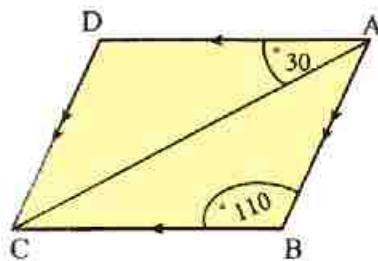
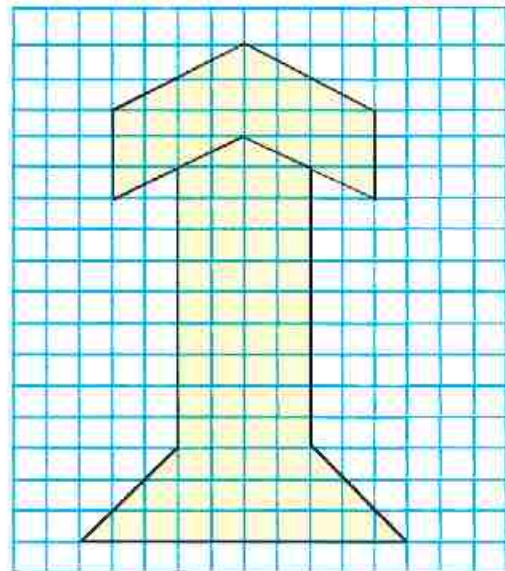
e) The two opposite angles are equal in each of ......,...... ,......,.....

f) The two diagonals bisects each ether in each of ....., ..., ...

g) The sum of measures of the two consecutive angles equals 180° in each of ...., ..., ...

2 **In the opposite figure try to use the geometric tools**

To get the greatest possible number of parallelogram

Colour the resuting paralleleograms in different colour

3 **the opposite figure shows a parallelogram in which.**

$M(\angle B) = 110^\circ$, $m(\angle DAC) = 30^\circ$

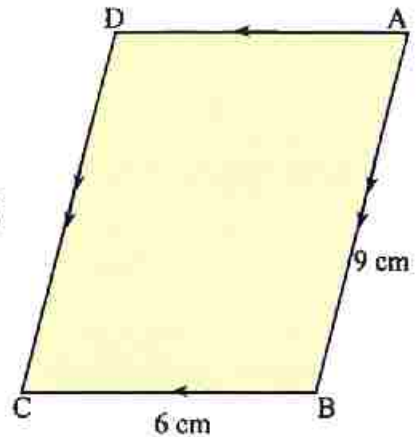
Find $m(\angle D)$, $m(\angle BAC)$

$m(\angle ACD)$

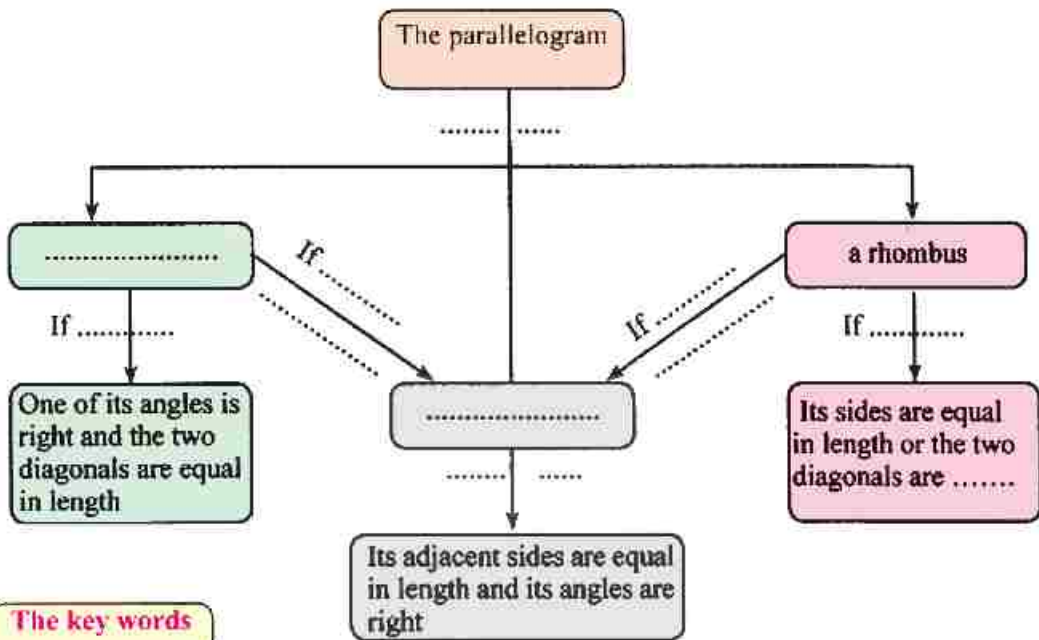
In the opposite figure

ABCD is parallelogram in which

AB= 9 cm , BC = 6 cm . Determine the point X on the side $\overline{AB}$ such that AX=BC

And determine the point Y on the side $\overline{DC}$ such that DY = BC

Complete the following

- The figure AXYD represents .... Because ....
- The figure ABCY represents .... Because ......
- The figure XBCY represents .... Because ....
- The type of the triangle AXY according to its sides is .... because ....

5 **Complete the following sketch of concepts using the key words below it**

A square A rectangle are Perpendicular If	is the two dimensions are equal the two diagonals are equal in length

2 The visual patterns

What do you learn from this lesson?

Through your active participation you will recognize

- The concept of visual pattern
- discrebe the visual pattern
- Discovering visual patterns and completing its repetition.
- forming visual patterns from geometric shapes
- Discovering the visual patterns in our natural life.
- forming repetition of the pattern and colouring it suitably to form on art figure

Mathematical
- concepts
- visual pattern

Think and discuss

In the previous years you have studied the visual patterns and the numerical patterns

- the visual pattern is a consequence of shapes or symbols according to a certian rule.

The following examples represents visual patters and its description is below it.

(The description of the pattern is repetition of)

(The description of the pattern is repetition of) ....

Drill 1

Discover the pattern in the following, then write its description and complete its repetition twice

- ....

.... (the description of the pattern ....)

- ....

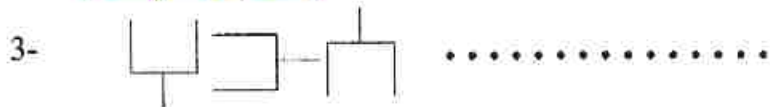
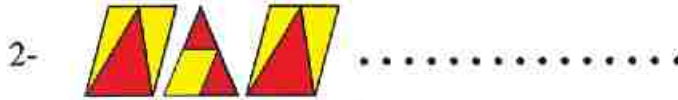
.... (the description of the pattern ....)

Drill 2 Discuss with your group , then draw the next shape in each pattern in each of the following.

1- ....

2- ....

3- ....

4- ....

Drill 3 Study the following geometric shapes, form visual patterns from it then describe each pattern and repeat it twice

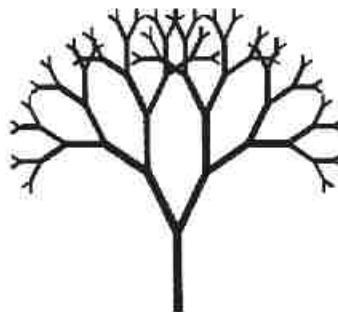
the shapes

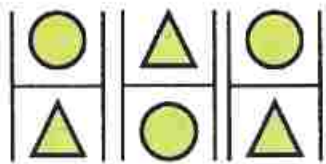
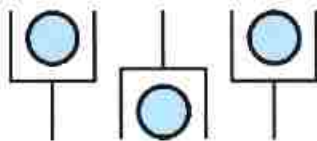
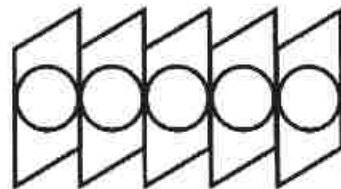
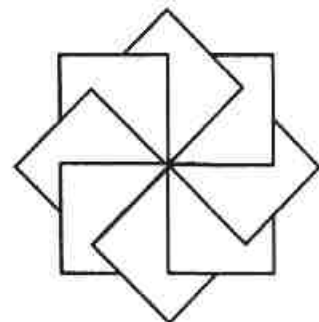
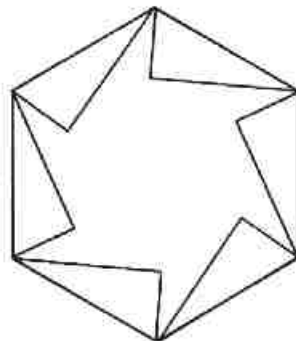
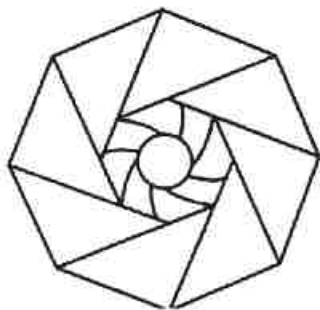
Example

(the description of the pattern is repeating)

1-.. (the description of the pattern...)

2-.. (the desception of the pattern...)

Drill 4 In our natural life there are many visual pattern, discover the pattern in each case in the following then coloure it with suitable coloure.

Exercise (3 - 2)

1 Discover the pattern in each case of the following and describe it then complete its repetition twice

2 Discover the pattern,describe it, then complete by repeating it(twice)

3 Discover the pattern and colour it's repetition in each shape alone with different colours to get an art figure

3 *Volumes*

What do you learn from this lesson ?

Through you active participation you will come to:

- The concept of the solid
- The concept of volume
- The volume units
- Calculating the volume of a solid by counting the units which formed it.
- converting from a unit of volume to another unit of volume.

1- The solid

You studied in the previous years the solids and you knew that .

all the following represents a solid.

The case of geometical instruments – the pen , The match case – mobile set ,the water bottle, the cube games, the ball bus , the car the house in which you live .... tc
this means that solid which occupies a room in the space.

Notice that

The solid are two kinds

- The geometric solid such as:

Mathematical concepts

The solid

The volume

The decimeter cube

The meter cube

The millimeter cube.

The cube | the cuboid | the cylinder

The sphere | the pyramid | the cone

And other solids which has no geometric shape as.

collapsed house

a Car

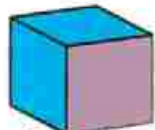
seashell

a piece of stone

this year we will give importance to two solids which are.

the cuboid

The cuboid

- It has six faces each of them is a rectangle.
- It has 12 edges and 8 vertices
- Each two apposite faces are equal in area and they are parallel .
- Each two adjacent faces intersect at a line segment which is called on edge

The cube

The cube

- It has six faces each of them is a square (They are all equal in all measures. (congruent)
- It has 12 edges , they are equal in length. It has 8 vertices

B- The volume

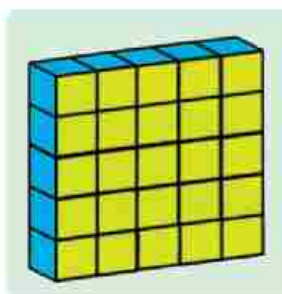
If The solid is any thing occupying a room in the space then .

The volume is the magnitude of this room which the solid occupies in the space.

How can we measure the volume?

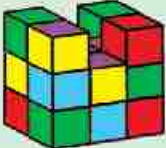
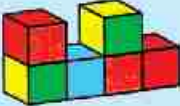
We can consider any solid as a unit for measuring the volume as

Match case – cube game – a bloc of soap – Juice can ….. etc

In This case the volume of the solid is the number of these units contained by the solid.

The number of blocks of soap = 25

The volume of the solid = 25 cases

The number of juice cases = 18

The volume of the solid = 18 cases

The number of match - cases = 9 cases

The volume of the solid = 9 cases

Drill 1 Each of Nada , Maryam, Omar and Magid builds a solid from cubes. Considering one cube is a uint for the volume complete the following table.

Solid of Maryam	solid of Omar	solid of Nada	solid of Magid
The number of Cubes = ……..	The number of Cubes = ……..	The number of Cubes = ……..	The number of Cubes = ……..
The volume =	The volume=	The volume=	The volume=

From the previous table compare

- the solid formed by Omar occupies a room in space …….. that the solid of Nada.
- The solid formed by Magid occupies room in space …… than the solid of Maryam .
- The solid formed by Omar occupies a room in space ……. Than the solid Maryam

Notice That

The previous units used to measure the volume (soap blocks – Match cases, cube games …..)

not international units to measure the volume because the volume of the solid changes if we change the used unit in measure and depends on the person who does the measure .

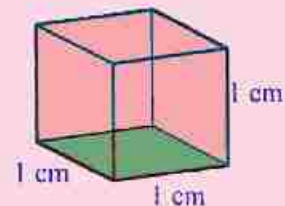
Then it is necessary to search for constant units agreed by the whole world to use them to measure the volume.

It is agreed to consider the cube whose edge length = (1 cm) as shown in the figure is the unit for measuring the volume.

i.e The unit which is used for measuring the volume is

The centimeter cube

It is the volume of a cube of edge length equals 1 cm

It is denoted by 1 cm^3

Example 1

Find the volume of the following solids consider the unit of measure of the volume is cm^3 ($1cm^3$)

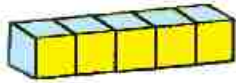



Fig. (1)

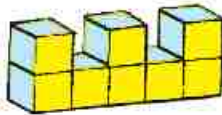



fig. (2)

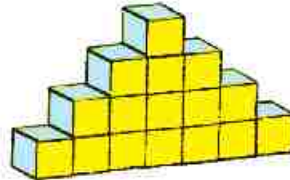



fig. (3)

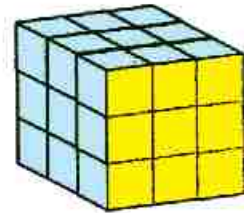



fig.(4)

Solution

In fig. (1) the number of cubic units = 5 units — The volume of the solid = 5 cm^3

In fig (2) The number of cubic units = 8 units — The volume of the solid = 8 cm^3

In fig (3) The number of cubic units = 16 units — The volume of the solid = 16 cm^3

In fig (4) The number of cubic units in each Layer = 9 cubic units

The solid consists of 3 layers

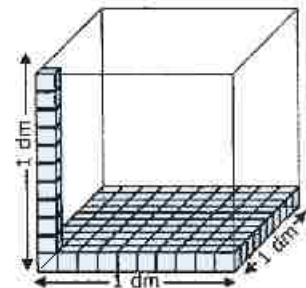
The number of cubic units in the solid = 3 x 9 = 27 units

The volume of the solid = 27 cm^3

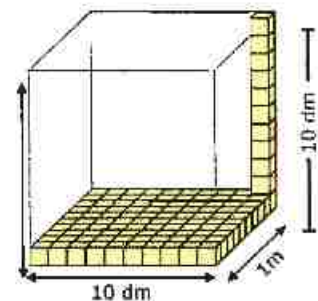
Another units for measuring the volumes

(a) In the case of great volumes

1- The decimeter cube

It is the volume of a cube of edge length one decimeter (1 dm) as shown in the figure. It is denoted by (dm^3) It is used sometimes to measure the volume of solids as the iron boxes, the carton case of television, washing machine or computer .... Etc

21 is formed from 10 layers in each of them 100 cm^3

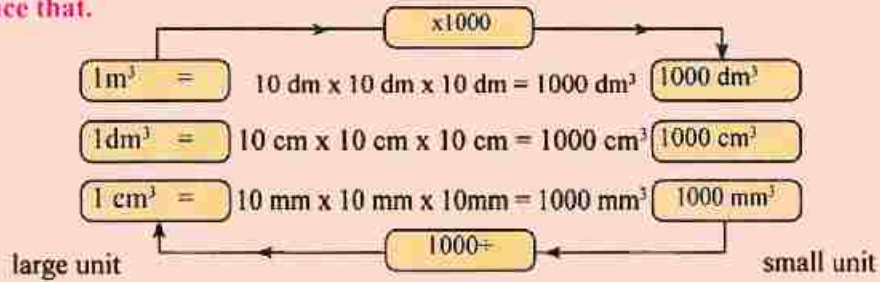
2- The meter cube

It is the volume of a cube of edge length (1m) as shown in the figure It is denoted by ($metre^3$) or (m^3) it is used sometimes to measure the volume of containers of factories or water tanks or edifices .... etc, it consists of 10 layers in each of them there are 100 dm^3

(b) In the case of small volumes

The millimeter cube

It is the volume of a small cube of edge length 1 millimetr

It is denoted by ($m\,m^3$)

It is used to measure the small volumes

Notice that as converting from a large unit of volume to smaller unit of volume we use multiplication operation.

As converting from a small unit of volume to larger unit of volume we use division operation.

Example 2: convert each volume's unit in the following to the opposite volume's unit

(1) $4\ m^3$ = ………………… = ………….. dm^3

(2) $700.5\ cm^3$ = …………… = ……… mm^3

(3) $300\ mm^3$ = ……………. = ……….. cm^3

(4) $6500\ dm^3$ = ………….. = ………………. m^3

Solution

(1) $4\ m^3 = 4 \times 1000 = 4000\ dm^3$

(2) $700.5\ cm^3 = 700.5 \times 1000 = 700500\ mm^3$

(3) $300\ mm^3 = 300 \div 1000 = 0.3\ cm^3$

(4) $6500\ dm^3 = 6500 \div 1000 = 6.5 m^3$

Drill 1 Calculate the volume of each of the following solids consider the volume unit is cm^3

Fig (1)

Frg. (2)

Frg. (3)

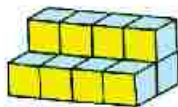



Fig (4)

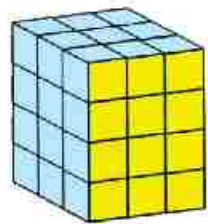



Fig (1)	Fig (2)	Fig (3)	Fig (4)
The number of cubic units = ………	The number of cubic units = …….	The number of cubic units = ………….	The number of cubic units = …………
The volume of The solid = ….. cm^3	The volume of the solid = ….. cm^3	The volume of the solid = ….. cm^3	The volume of the solid = …… cm^3

Exercise (3 - 3)

1 Find the volume of each solid in the following considering the volum's unit is cm³:

Fig (1)

The volume of

The solid =............cm³

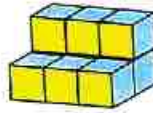



fig (2)

The volume of

The solid =............cm³

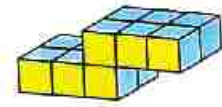



fig (3)

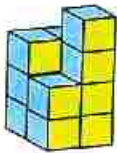
The volume of

The solid =............cm³

Fig (4)

The volume of

The solid =............cm³

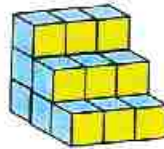



Fig (5)

The volume of

The solid =............cm³

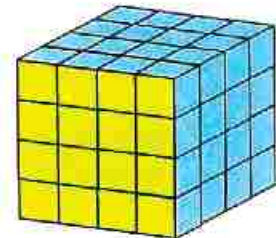
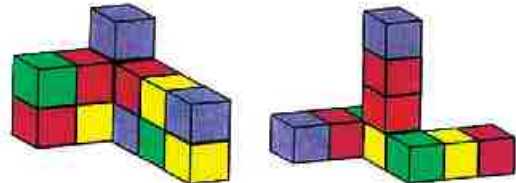



Fig (6)

The volume of

The solid =............cm³

2 Find the volume of each of the following solids considering the volum's unit is the games cube whose volume is 8 cm³.

3 Convert each of the following volumes into the opposite volume's units:

(a) 120dm³ =...................cm³

(b) 8200mm³ =...................cm³

(c) 3m³ =...................mm³

(d) 2.1cm³ =...................mm³

(e) 56000cm³ =...................dm³

4 *The volume of the cuboid*

What do you learn from this lesson?

Through your active participation you will come to :

- How to calculate the volume of a cuboid by different ways.
- Solving miscellaneous applications on the volume of the cuboid.

The mathmetical concepts
- The cuboid
- The volume

Think and discuss

fig (1)

The teacher of mathematic asked his students to make groups, each consists of 2 pupils to work in pairs to use games cubes for making a cuboid of dimensions the length 4 cubes, the width 3 cubes, the height 2 cubes. After giving the suitable chance the teacher selected the design of (Ola and Nabeela) as in figure (1). He asked them to show their idea to their companions.

Ola : We thought together to form the first layer which is formed from 3 rows in each row 4 cubes, then the length of the layer became 4 cubes and its width became 3 cubes as shown in figure 2.

fig (2)

Nabeela : We formed the second layer in the same way and put it on the first, then we get the required cuboid. Fig (1)

The teacher : Thanks for you all, the question now is : How can we calculate the volume of the resultant cuboid?

Mohamed : The volume is the room occupied by the cuboid in the space.

The teacher : Wonderful, but How can we calculate this room?

Adel : We count the volume units used which is the games cubes.

The teacher : Good answer – but How can we carry out this operation?

Merna : We count the volume units in the first layer which is 3 rows and each row contains 4 cubes, then its volume is $4 \times 3 = 12$ cubes.

The teacher : Very good – Then what afterwards?

Ahmed : We count the volume units in the second layer in the same way i.e. its volume = $4 \times 3 = 12$ cubes.

The teacher : Very good. What else?

Omar : We add the volume cubes in the two layers, the volume of the cuboid = 12 + 12 = 24 cubes.

The teacher : Excellent answer. Who can get the same answer by another way?

Karmina : We multiply the volume of one layer by 2.

Then the volume of the cuboid = $(4 \times 3) \times 2 = 24$ cubes.

The teacher: Very good. But what do we mean by $4 \times 3 \times 2$?

Mina : it represents the product of the length × the width × the height.

The teacher : That is best. Who can express this result in another form?

Khalid : The product of the three dimensions.

The teacher : Excellent answer. But what's ment by (the length × the width)?

Fady : It represents the area of the base.

The teacher : Very good. Who can express the volume of the cuboid in another way?

Zeinab : The volume of the cuboid = The base area × The height.

The teacher : That is a correct answer and now who can summarize the mathematic statements of the volume of the cuboid?

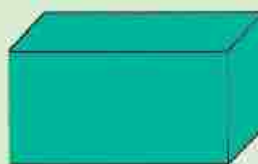
Mustafa : There are four correct statements which are.

The volume of the cuboid.

= The number of the volume units which form it.

=The product of length x width x height.

= The product of the three dimensions.

= The base area × The height.

The teacher very good - What is the volume of the cuboid in fig (1) if it is rotated as in the figure (3).

Nady :- the volume = the base'area x the height. = $(4x2) \times 3 = 24$ cubes

The teacher very good answer what does that mean upon your own views.

Hassan: the volume does not change

That means

We can consider any face of the cuboid as a base for it.

fig (3)

The volume of the cuboid = the area of any face x the corresponding height.

The teacher: Excellent answer

And now what about if the units of volume became the (cm^3) instead of gams cubes as in fig. (4).

What is its volume?

Shady: cm^3 is the unit of measuring the volume

In this case the volume of the cuboid = 4x3x2 = 24 cm^3

The teacher:- Excellent answer and thanks for you all.

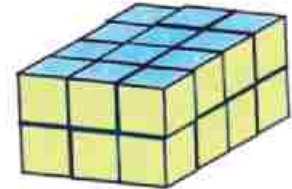



fig. (4)

Example (1) find the volume of the cuboid in each of the following cases.

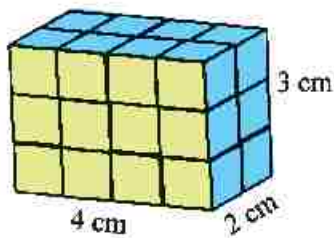
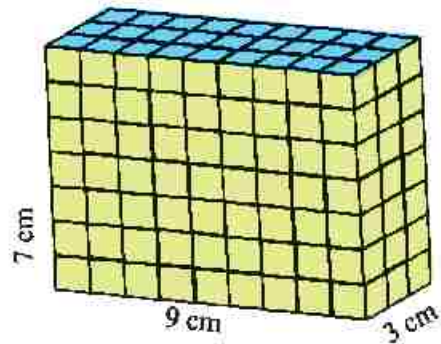



fig. (1)

fig. (2)

Solution

In fig . the volume of the cuboid = length x width x height.

= 4 x 2 x 3 = 24 cm^3

In fig. (2) the volume of the cuboid = the area of the base x the height

= (9 x 3) x 7 =189 cm^3

Notice from fig. (2)

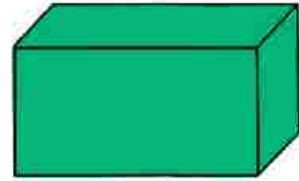
The area of the base of the cuboid = $\frac{\text{the volume of the cuboid}}{\text{the height}}$

The height of the cupoid = $\frac{\text{the volume of the cuboid}}{\text{the area of the base}}$

Example 2 In The opposite figure

A cuboid of volume is $2128 cm^3$

Its length is 19cm, its height is 14cm

Find the area of its base and its width

Solution

The volume of the cuboid = The area of the base x The height

i. e 2128 = The area of base x 14

That means

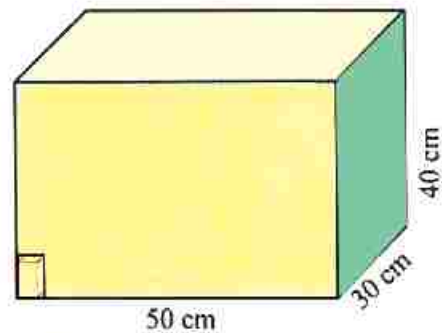
The base area = $\frac{2128}{14} = 152 \text{ cm}^2$

Since the base area = length x width i. e 152 = 19 x width

That means The width = $\frac{152}{19}$

i.e. The width = 8 cm

Example 3

A box made of cartoons in the shape of a cuboid, its internal dimensions are 50, 40 and 30cm. How many blocks of soap can be put inside it to be full completely if the dimension of each block of soap are 8,5 and 3cm.

notice the position of the block of soap

Solution

The volume of the box = 50 x 40 x 30 = 60000 cm^3

The volume of are block of soap = 8 x 5 x 3 = 120 cm^3

The number of blocks of soap = the volume of the box/ The volume of

$= \frac{60000}{120}$ = 500 block of soap

Example 4

A building worker used 1500 bricks to build a wall. Calculate the volume of the wall in m^3 if the brick is in the shape of a cuboid of dimensions 25, 12 and 6cm.

Solution

The volume of are brick = 25 x 12 x 6 = 1800 cm^3

The volume of the wall = 1800 x 1500

= 2700000 cm^3

i. e The volume of the wall in m^3

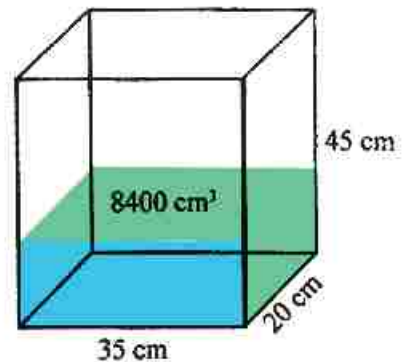
$= \frac{2700000}{1000000} = 2.7 \text{ m}^3$

Example 5

8400 cm^3 of water is poured into a vessel in the shape of a cuboid with internal dimensions 20, 35 and 45 cm

Find :

1- the height of water in the vessel.

2- The volume of water needed to be added for the vessel becomes filled with water completely.

Solution

The water poured in the vessel is in the shape of a cuboid.

i. e The volume of water in the vessel

= The base area x height

i. e 8400 = (35 x 20) x The height

i. e The height of water = $\frac{8400}{35 \times 20} = \frac{8400}{700} = 12$ cm

2- The volume of water needed to be added for the vessel becomes filled with water completely can be obtained by two methods

The first method

The volume of the whole vessel

= 20 x 35 x 45 = 31500 cm^3

i. e The volume of the added water

= 31500 - 8400 = 23100 cm^3

The second method :

We calculate the volume of the empty part of the vessel

The volume of the added water

= 35 x 20 x (45−12)=35 x 20 x 33

= 23100 cm^3

Exercise (3 - 4)

1 Which is greater in volume?

A cuboid of dimensions 70. 50 and 30 cm or a cuboid whose base area = 2925 cm^2 and its height = 35cm.

2 How many cm^3 are enough to form a cuboid of dimensions 17, 13 and 11 cm.

3 Complete the following table

The dimensions of the cuboid			The area of the base	The volume
Length	Width	Height	Cm^2	Cm^3
12		7	60	
	4	8		160
8	6			528
21.5			365.5	4751.5

4 A Juice case in the shape of a cuboid.

Its base is square shaped of side length 6cm and its height is 15cm calculate the volume of juice which fills the case completely.

5 A sweet case in the shape of a cuboid its internal dimensions are 21, 18 and 6 cm It is wanted to fill it with pieces of chocolates each of them is a cuboid of dimensions 3, 3 and 1cm, calculate the number of pieces of chocolates which fill the case completely.

6 A Truck for transporting goods.

Its dimensions are 3.2 , 1.5 and 2metre. It is wanted to fill it with cartoons boxes for mineral water bottles to distribute it to the commercial shops. The dimensions of one cartoons box. Are 40, 25 and 25cm. calculate.

a- The greatest number of cartoon boxes of can be carried by the truck.

b- The cost of transportation if the cost of transporting one cartoon is 0.75 pounds.

7 A swimming pool, its internal dimensions are 30, 15 and 2metres. 405 m^3 of water are poured into it

Find :

a- The height of water in the swimming pool.

b- The volume of water which is needed to fill the swimming pool completely.

5 *The volume of the cube*

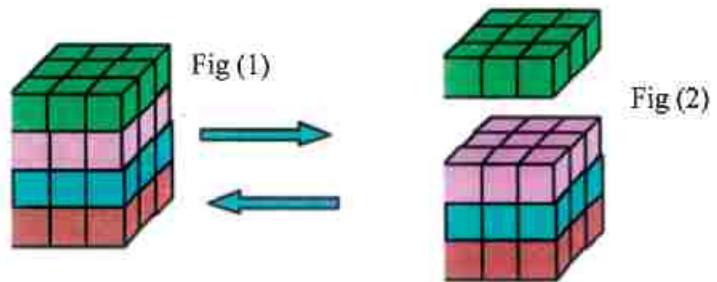
What will you learn from this lesson?

- Through your active participation you will come to:

How to calculate the volume of the cube by different methods.

How to solve miscellaneous applications on the volume of the cube.

Mathematic concepts

The volume of the cube

the fig.(1) is a cuboid consists of 4 layers, each layer has 3 rows and each row has 3 cubes . what is the resulting solid . if we remove the upper layer as in fig.(2)

Notice that the resultant solid as you know is a cube because its faces are congruent and its edges are equal in length.

That means that

The cube is a special case of the cuboid

when the length = the width = The height

i. e

The cube is a cuboid with equal dimensions

The volume of the cuboid = length x width X height

The volume of the cube = The edge length x it self x if self

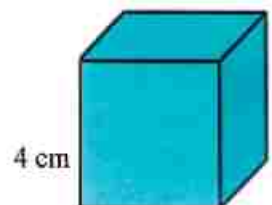
Example 1

Find the volume of a cube of edge length 4 cm .

Solution

The volume of the cube

= edge length x it self x it self

= 4x4x4 = 64cm^3

Example 2

The sum of lengths of all edges of a cube is 132cm calculate its volume.

Solution

The cube has 12 equal edges in length

i. e The edge length = $\frac{132}{12}$ = 11cm.

The volume of the cube = 11 x 11 x 11 = 1331 cm^3

Example 3

The sum of faces area of a cube 54 cm^2

Calculate its volume.

Solution

The cube has 6 faces equals in its area

The area of each face = $\frac{54}{6}$ = 9 cm^2

Where area of each face = side x side

9 = ... x ... ... i.e 9 = 3 x 3

Then the side length = 3 cm

Then the volume of cube = 3 x 3 x 3 = 27 cm^3

Example 4

A metallic cube of edge length 9cm It needs to be conveted it into ingots in the shape of cuboids each of them has the dimensions 3, 3 and 1cm. calculate the number of ingots that are obtained.

Solution

The volume of the metallic cube

= 9 x 9 x 9 = 729 cm^3

The volume of one ingot = 3 x 3 x 1 = 9cm^3

* The number of the obtained ingots

= the volume of the metallic cube/ the volume of one ingot

= $\frac{729}{9}$ = 81 ingots

Exercise (3 - 5)

1 Complete the following table

The Cube				
The edge length cm	The perimeter of the base cm	The area f the base cm^2	The sum of lengths of all edges cm	The volume cm^3
6	....	....	....	216
....	20	....	....	....
....	....	49	....	....
....	....	....	108	....

2 We have an amount of rice, its volume is 2700 cm^3. It is need to put it in a carton box. Show which of the following boxes is the more suitable and why?

a- A cuboid with dimensions 45, 40 and 15cm.

b- A cube, its internal edge length = 20 cm.

3 A commercial shop shows a cubic case with edge length 12cm, it is filled with honey Calculate the amount of money that a person pays for buying 3 cases of honey of one cm^3 is sold for 0.05 pounds.

4 A box of carton in the shape of a cube. Its external edge length is 30cm

An antique made of glass is put inside it. And for protecting it from damage, the box is put inside another box of carton in the shape of cube, its internal edge length is 36cm, the empty part between the two boxes is filled with sponge form all over sides. calculate the volume of sponge.

5 A cube of cheese, its edge length is 15cm It needs to be divided it into small cubes the edge length of each is 3cm for presenting them through meals. Calculate the number of the resulting small cubes.

6 An aquarium for fish is cube shaped It has a lid. The internal edge length of the aquarium is 35cm. the aquarium is made of glass. Find the volume of the glass given now that the thickness of the glass is 0.5cm.

6 The Capacity

What will you learn from this lesson?
Through your active participation you will come to:
- The concept of capacity.
- The units of capacity.
- Solving miscellaneous applications of calculating the capacity.

Mathematical concepts
- The capacity
- Liter
- The milliliter

Think and discuss :

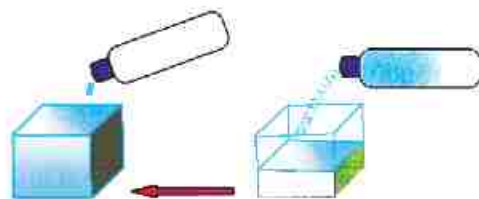
the capacity

Is the volume of the inner space for any hollow solid

In the case of vessels:

The capacity of the vessel:

It is the volume of the liquid which fills the vessel completely

The capacity of vessel is measured by a unit called litre.

What is the litre?

The previous figure shows a mineral water bottle with capacity "1" litre and an empty container in the shape of a cube of edge length 1dm (10cm) - As pouring the liquid from the bottle to the container we find that it is filled completely.

From the previous we deduce that

The unit of measuring the capacity is the litre = dm^3 = 1000 cm^3

Notice That The milliliter is a common unit (a part of the litre) for measuring the capacity.

The milliliter = cm^3 and It is denoted by ml that means that 1 litre = 1000 milliliter.

Example 1

A box of milk of capacity 2 litres. And another box of capacity 200 milliliters.

How many boxes of the second kind are needed to be filled with the milk of the first box completely.

Solution

The number of required boxes = the capacity of the large box/ the capacity of the small box

$= \frac{2000}{200} = 10$ boxes

The relation between the units of volume and the units of capacity

dm^3 = 10cm x 10cm x 10cm = 1000 cm^3 = 1 litre

m^3 = 10dm x 10dm x 10dm = 1000 dm^3 = 1000 litre

cm^3 = 10mm x 10mm x 10mm = 1000 mm^3 = 1 ml

Example 2

Convert each of the following to litres

(a) 5600 cm^3 (b) 0.23 m^3 (c) 9.52 dm^3

Solution

(a) 5600 cm^3 = 5600 x 1/1000 = 5.6 litre

(b) 0.23 m^3 = 0.23 x 1000 = 230 litre

(c) 9.52 dm^3 = 9.52 litre

Example 3

Convert each of the following into cm^3

(a) 4.63 litre (b) 55 ml (c) 0.66 m^3

Solution

(a) 4.63 litre = 4.63 x 1000 = 4630 cm^3

(b) 55 ml = 55 cm^3

(c) 0.66 m^3 = 0.66 x 1000000 = 660000 cm^3

Example 4

A swimming pool in the shape of a cuboid whose internal dimensions are 40m, 30m, 1.8m Find its capacity in litres.

Solution

The volume of the swimming pool = 40 x 30 x 1.8

= 1200 x 1.8 = 2160m^3

The capacity in litre = 2160 x 1000 = 2160000 litre.

Exercise (3 - 6)

1 Write the suitable unit from the units (m^3, cm^3, dm^3, litre, ml) to measure the following.

- The capacity of a water tank on the roof of a house. ( )
- The volume of cereals container. ( )
- The capacity of oil bottle. ( )
- The volume of an amount of medicine in a syringe. ( )
- The capacity of a swimming pool in a sport club. ( )
- The volume of a box of carton of T. V set. ( )

2 A cube shaped vessel, its internal edge length is 30cm. it is filled with food oil.

a- calculate the capacity of the vessel.

b- If the price of one litres of food oil is 9.5 pounds calculate the price of all oil.

3 A container has 12 litre of honey. It is wanted to put them in smaller vessels (bottles) the capacity of each of them is $400cm^3$. calculate the number of bottles which is needed for that.

4 A patient take a medicine spoon of capacity 3ml daily in the morning and at evening. After how many days does the patient take 240 cm^3 from this medicine.

5 A container in the shape of a cuboid, its internal dimensions are length = 25cm, the width = 30 cm, The height = 42cm . An amount of solar is Put in it, its height = $\frac{1}{3}$ the height of the container. calculate

a- The volume of solar in the container

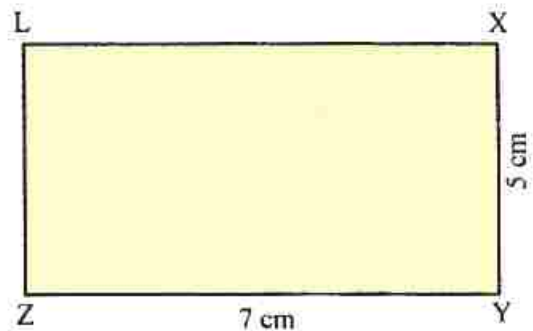
b- The total price of solar in the container if the price of one litre of solar = 1.2 pounds.

General exercises on unit 3

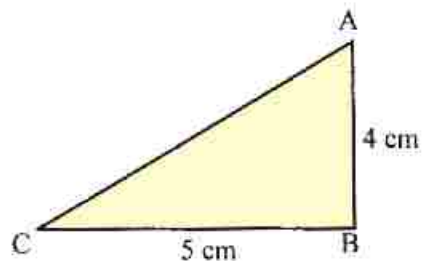
1 Write the name of the figure through the following descriptive statement.

No	The descriptive statements for the figure	The name of the figure
1	- The figure ABCD in which AB = BC = CD = DA, The two diagonals are perpendicular and not equal, m (∠A) ≠ m (∠B)	....
2	- The figure XYZL in which XY = ZL, YZ = XL, XY ≠ YZ The two diagonals are equal.	....
3	- The figure DEFL in which DE = LF, EF = DL, DE ≠ EF, The two diagonals are not equal, m (∠D) ≠ m (∠E).	....
4	- The figure ABCD in which AB = BC = CD = DA, The two diagonals are equal, and perpendicular.	....

2 In the opposite figure XYZL is a rectangle in which XY = 5cm, YZ= 7cm, Show in steps how can you draw a square inside the rectangle such that $\overline{XY}$ is one of its sides

- Write all the parallelograms which are obtained in the figure.

3 The opposite figure ABC is a right angled triangle at B in which AB = 5cm. Try to draw a parallelogram in the following cases:

a- A parallelogram such that $\overline{AB}$ is a diagonal of it.

b- A Parallelogram such that $\overline{AC}$ is a diagonal of it.

4 A lorry for transporting building materials, the internal dimensions of the container are 5m, 1.8 and 0.6m. Its wanted to fill it completely by bricks of dimension 25cm, 12cm and 6cm, Calculate:

a- The greatest number of bricks can be Put in the container of the lorry.

b- The cost of transporting the bricks if the cost of transporting 1000 bricks is 35 pounds.

5 Which is greater in volume and why?

A cuboid whose dimensions are 12cm, 10cm and 8cm or a cube of edge length 10cm.

6 A tin in the shape of a cube, its internal edge length is 36cm, is filled with maize oil It is wanted to put it in small tins in the in the shape of cubes, its internal edge length is 9cm. Find the number of small tins needed to that.

7 The sum of all dimensions of a cuboid is 48cm and the ratio among the length of its dimensions is 5: 4: 3 Find its volume.

8 A cuboid, its base is a rectangle whose perimeter = 40cm. the ratio between its length to its width = 3 : 2.

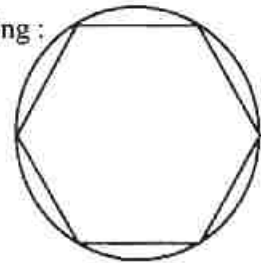
Calculate its volume if its height is 10cm.

9 A box of cartoons its internal dimensions are 50, 40 and 30cm. It is wanted to fill it with boxes of tea In the shape of cuboids, the dimension of each box are 10cm, 5cm and 6 cm.

Calculate the greatest number of tea boxes can be put in the box.

(1) from the opposite figure and using the geometric tools answer the following :

a- Write the greatest number of parallelograms you can draw in the figure.

b- Write the greatest number of trabeziums you can draw in the figure.

(2) from the opposite figure and complete :

- Three parallelograms

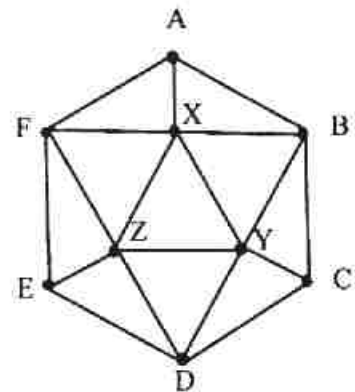
They are ………, ……….., ……….

- Three Trapeziums

They are ………, ……….., ……….

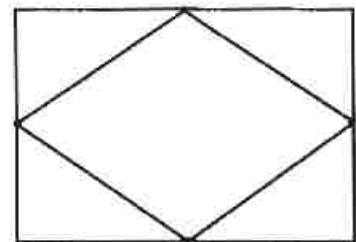
- The number of triangles in the figure = …………

- Three triangles in the figure

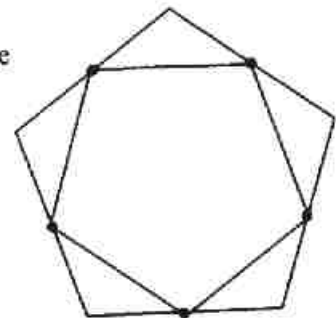
They are ………, ……….., ……….

(3) The opposite figure is a rectangle the pattern is :

joining the mid points of the consecutive sides

a- Complete by drawing three internal figures due to this pattern.

b- Colour the obtained figure by different colours to get an art figure.

(4) The opposite figure is a regular pentagon the pattern is joining the mid- points of the consecutive sides.

a- complete by drawing three internal figures due to the same pattern.

b- colour the obtained figure by different colours to get art figure.

A technological activity

Drawing geometric figures and solids using word programme.

What do you learn from this activity.

Using word programme to

- Draw a group of geometric figures (rectangle - square - parallelogram)

Draw a group of geometric solids (cuboid - cube)

Example

Using word programme draw the following geometric figures and solids

(a rectangle - a square - a parallelogram, a cuboid - a cube)

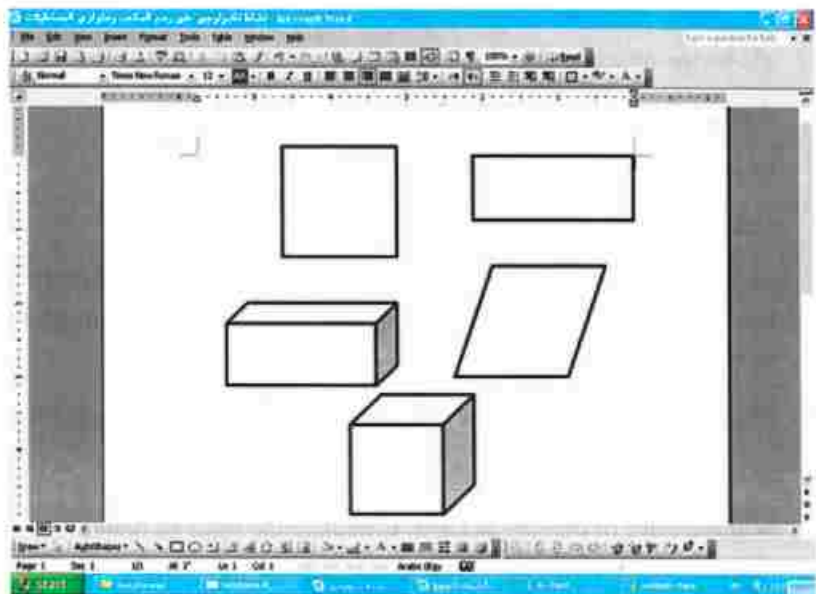
The procedure

1- Click (start) then select program then select Microsoft word. And open new document.

2- Press the symbol ☐ at drawing tape below the screen. Then click by the mouse in an empty region I the word page and through drawing and estimating the size of the rectangle and leaving out, the rectangle will appear.

3- press second time the some symbol ☐ then click shift and go on pressing, during this press in an empty region, then through drawing and leaving when you get the required square.

4- Select auto shapes which exists at the drawing tape, then select Basic shapes then select the figure parallelogram ▱ , and draw the parallelogram trough drawing and leaving out due to you estimation.

5- to draw a cube and a cuboid. Select Auto shapes then select basic shaper then select the shape to the solid , then draw the cube and the cuboid and leaving out due to your estimation . you will obtain the following figure.

(1) Complete the following

a- The rectangle is a parallelogram ....

b- 120 dm³ = ... = ... cm³

c- 2580000 mm³ = ... = ... m³

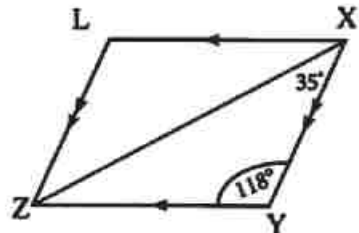
d- the volume of the cuboid = ... × ....

e- 2.65 litre = ... = ... cm³

(2) The opposite figure

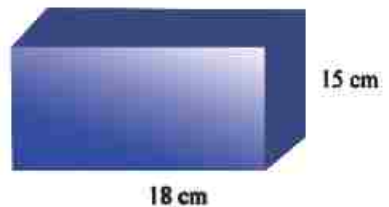
XYZL is a parallelogram in which

m (∠Y) = 118°, m (∠YXZ) = 35°

Find m (∠ L), m (∠LXZ)

(3) Discover the pattern in each of the following cases, then describe it and complete its repetition twice

a- !!??!!??... (the pattern is ....)

b- .... (the pattern is ....)

(4) How many cm³ are enough to fill a box in the shape of a cuboid, its internal dimensions are 50cm, 35cm, 20cm.

(5) In the opposite figure

A cuboid of volume 6480 cm³

Its height = 15 cm, its width= 18cm

Calculate its length.

(6) A box of milk in the shape of a cube of edge length 12cm. It is wanted to put a number of these boxes in a box of carton in the shape of a cube of edge length 60cm. How many boxes of milk can be but in the cartoon box?

(7) A vessel in the shape of a cube with edge length 15 cm is filled with honey.

a- Calculate the capacity of the vessel.

b- If the price of one lire is LE 8. Calculate the price of honey.

Unit 4 :

Statistics

1 *The Kinds of Statistics data*

What do you learn from this lesson?

Through your active participation you willcome to:

- The meaning of descriptive data.
- The meaning of quantitive data.
- Completing writing descriptive and quantitive data.

Mathematical concepts

- descriptive data
- quantitive data
- data sheet.
- data base.

Notice and deduce

The Specialist Hospital

Requisition for medical examination

The name ....

The age...

Examination date / /20

Sex male female

The birthday / /20

The birth place...

The address...

The social case...

The eductional case...

The kind of disease...

The degree of disease...

The tallness...

The weight...

The temperature degree

Blood species

Hany is a pupil in sixth grade. He went with his mother to the hospital for medical examination.

The employee asked him to complete the data in he sheets of medical examination.

Hany asked his mother about the required data. His mother replied. There are some data require writing digits as : age, the date of examination, the birthday, height, the weight, the degree of temperature….. etc.

There are other data required writing words or Statement as:

The name, sex (male, female), social case (married, single), educational case (not educated, educated), the birth place, the address, blood species (O, A, B) ….. etc.

Through the discussion between Hany and his mother It shows that:

The statistics data which we use in our daily life are two kinds.

1- descriptive data : they are data written in the form of description to the case of the persons in the society as : the favorite colour, favorite food, the birth place, the social case, the education case, profession case….. etc

2 - Quantative data : they are data written in the from numbers to express a certain phenomenon as: age , height, weight, the shoes size, number of sons, the student's mark in the examination …. Etc.

Drill (1) The opposite figure shows the sheet- model of requisition for one of your fellows to join with a sport activity during the summer holiday in a sports club near to his house.

The Specialist Hospital

Requisition for medical examination

The name ....

The age..

Examination date / / 20

Sex male female

The birthday / / 20

The birth place..

The address..

The social status..

The educational case..

The kind of disease..

The degree of disease..

The height ....

The weight..

The temperature degree

Blood type

Examine it well then answer the following.

(a) There are in the sheet. Model a descriptive data as ....

(b) There are in the sheet- model a quantitive data as ....

(c) Register your name in the card, then complete one of the descriptive data and one of quantitive data.

Notice that

The data requisition sheet is a sheet contains a set of data some of them is descriptive and the other is quantitive belong to a certain person or a thing.

Drill (2) MR. Khaled is the superior of a class in the sixth grade in a primary school. He wanted to set up data base about his pupils. He designed the following table

Series number	The name	Age		height in cm	How to arrive to school	Favourite activity		
		Month	year					
1	Ahmed Omar	6	11	147	Walking	School broad casting		
2	Adel Said		12	150	Bus	Scouts		
3	Nermeen Nabeel	7	11	141	Taxi	School press		

Look at the previous table and answer the following.

1- Determine which column represents descriptive data and which one represents quantitive data.

2- Complete the two missed columns in condition that one of then for descriptive data and the other for quantitive data.

3- Consider yourself one of MR. Khalid's pupils and register your data.

Notice that:

Data base is a set of descriptive data and quantitive data belong to some persons or establishment or administrations… or authorities ....

Exercise (4 - 1)

(1) Read the data on the box of milk then classify the data registered on it into descriptive data and quantitive data.

- The descriptive data are ………………
- The quantitive data are ………………

(2) The opposite figure shows a model sheet to one of personal cards of a pupil in a school. Look at it well and then extract from it descriptive data and quantitive data.

Write you own personal data on this sheet.

A personal card of pupil
School name. ……………………………
Name ……………………………
Grade ……………………………
Class: ……………………………
School year ……………………………
Birthday ………/………/……20………
Blood type
Tel. house………………
mobile………………

Personal Photo

(3) In the following the model sheet of data base to the members are participating in a sport club.

No	The name	Age	The date of participating	Favorite game	Blood species	The adress	Telephone number
1							
2							
3							
4							

- Determine which columns represent descriptive data and which one of them represents quantitive data.
- Consider yourself one of members of this club and register your name from today and complete the data.

2 Collecting descriptive statistic data

What do you learn from this lesson?

Through your active participation you will come to:
- How to put descriptive data in frequency data table.
- How to form a simple frequency data table. (descriptive data) Extracting information's from data In a simple frequency table.

Notice and deduce

A class contains 36 pupils. The superior of pupils to register the hobbies which each of them prefers selecting it from five hobbies (singing, drawing, acting, reading, playing music) for making a competition concerned with these hobbies.

The data were as follows.

Mathematical concepts
- forming the tally frequency table.
- forming a simple frequency table.

drawing - reading - playing music - singing - acting - reading
playing music - drawing - acting - reading - playing music -
acting - singing - reading - drawing - acting - drawing
singing - playing music - drawing - acting - drawing - reading
reading - drawing - acting - reading - drawing - singing
drawing - reading - singing - acting - drawing - playing music

How can you deal with these data?

You may notice that all these data are descriptive data.. In order to collect them we should use the tally frequencie data table. As you studied in fifth grade as follow.

The tally frequency data table.

The hobby	Tallies	Frequence
Singing	~~////~~	5
Drawing	~~////~~ ~~////~~	10
playingMusic	~~////~~	5
Acting	~~////~~ //	7
Reading	~~////~~ ////	9
total		36

If we take away the column of tallies from the previous frequency data table we will get the distribution frequence table as follow

The hoppy	singing	drawing	acting	reading	music	total
Number of pupils	5	10	7	9	5	36

This table represents the distribution of the pupils of a class in six the grade due to their hoppies.

The previous table is called the simple frequency table because all data which it contains are distributed due to one description which is the preferable hobby in this activity.

Through the previous table answer the following.

- What is the hobby which the most pupils prefer ? and what is its percentage?
- What is the hobby which is the least preferable? And what is its percentage ?
- What is your advice to the director of this school? And the superior of this class to do about these hobbies?

Exercise (4 - 2)

1 The following table shows the distribution of the number of the foreign tourists in millions who visited Egypt in 2009 due to their nationalities.

Nationality	French	German	British	Russian	Italian	total
Number of tourists in million	0.8	1.2	1.34	2.35	1.04	6.37

a- What are the countries from which the most tourists visited Egypt? What is their percentage?

b- What are the countries from which the least tourists visited Egypt? How many tourists from these countries visited Egypt?

c- What is the number of German tourists? What is their percentage?

2 If the public score of 40 students in Arabic language in a university is as follows.

very good - good - pass - good - excellent - good - good

very good - good - very good - good - good

excellent - very good - excellent - excellent - pass

good - good - very good- good - pass

very good - very good - good - very good- pass - good

very good - good - pass - very good - excellent

pass - pass - excellent - good - pass

Form the Tally frequency table. Then form the frequency table for the previous results then answer the following questions.

- What is the most common score of the students?
- What is the least score of the students?
- What is your advice to the students In this important educational stage?

3 Collecting The statistics quantative data

What do you learn from this lesson?

Through your active participation you will come to.

- putting the quantitive data in the tally frequency table.
- forming the frequency table of equal sets from the frequency table of quantitive data .
- Extracting information table of equal sets

Mathematical concept

The raw marks
The range
The frequency table of equal sets.

Notice and deduce

Think and discuss. The scores of the pupils of a class of sixth grade in mathematics at the end of the year had been Collected for 42 pupils their marks were as follows given the fall mark is 60.

36 – 32 – 42 – 38 – 45 – 28 – 42 – 57 – 20 – 41 –
59 – 49 – 48 – 46 – 40 – 48 – 51 – 53 – 54 – 55 –
36 – 33 – 44 – 57 – 54 – 46 – 52 – 26 – 37 – 30 – 34 –
47 – 35 – 44 – 29 – 49 – 49 – 50 – 23 – 43 – 39 – 43.

These marks are called raw marks, That means the marks of pupils after correction to their exam. Papers as they are scattered.

For example .

what is the number of excellent pupils ?

and what is the number of pupils of low level?

And what is the number of pupils of intermediate level?

Notice that

The only thing that can be extracted from these raw marks is the least mark = 20 and the maximum mark = 59 that means that the marks of mathematics of the pupils of that class are distributed in range = 59 - 20 = 39 marks.

In order to deal these marks by studying and analyzing we should put them in a frequency table. That will be carried out through the following steps.

1 - Determine the highest and the lowest value.

In this example

The maximum mark = 59

The minimum mark = 20

2 – determine the range of this distribution it is = The maximum mark – the minimum mark

In this example the range = 59 – 20 =39

3 – Summarise these data by dividing it into a Suitable number of sets by determining a Suitable length for each set say 5 marks in this example.

- We start with the smallest mark and finished at the greatest mark.

Then we obtain 8 sets. As follows

First set contains the marks of pupils from 20 marks to less than 25 marks it is expressed as 20-

Second set contains the marks of pupils from 25 marks to less than 30 marks It is expressed as 25-

The third set Contain the marks of pupils from 36 marks less than 35 marks

It is expressed as 30-

And so on till the last set which will be

The eighth set contains the marks of pupils from 55 marks to less than 60 marks

It is expressed as 55-

Notice that

The number of sets can be calculated by the following relation

$$\text{The number of sets} = \frac{\text{the range}}{\text{the length of set}}$$

In this example

$$\text{The number of sets} = \frac{39}{5} = 7\frac{4}{5} \simeq 8 \text{ sets.}$$

In this way. The sets contained all raw marks of the pupils

4 – putting these data in a tally frequency table as in the opposite table.

Sets	Tallies	Frequence
20-	//	2
25-	///	3
30-	////	4
35-	/ ~~////~~	6
40-	/// ~~////~~	8
45-	//// ~~////~~	9
50-	/ ~~////~~	6
55-	////	4
Total		42

5 – we take away the tally column from the previous table to get the frequency table of equal sets as in the following table.
It is call as thus because the data contained in it has been distributed into sets.
Therefore it is called

The distribution of the marks of the pupils in mathematics in a class of the school.

Sets of marks	20-	25-	30-	35-	40-	45-	50-	55-	Total
Number of pupils	2	3	4	6	8	9	6	4	42

Answer the following questions.

- What is the number of pupils who get 50 marks or more? What is the percentage of them?
- What is the number of pupils who get the least marks as your point of view? And what is their percentage?

What da you advise your fellow pupils in mathematics?

Drill (1)

cooprative learning

During a trip to a factory of clothes has been hold by the pupils of shool in the governorate Hend and Nabeela collected data about the wages of the works weekly, the number of workers was 60 person. Hend and Nabeela registered these data in a frequency table of sets as follows.

The weekly wages	50-	60-	70-	80-	90-	100-	110-	Total
Number of workers	4	7	12	18	11	5	3	60

The distribution of the weekly wages of the workers in the factory.

Read the table well with your group members then answer the following questions

- The least weekly wage which the worker gets.
- The weekly wage which the maximum number of workers obtain lies between …………….. and ……………………
- The percentage of the number of workers who obtain the least weekly wage is …%
- The number of workers whose weekly wages are L.E 100 and more is ….

And their percentage is ……%

Exercise (4 - 3)

1 In a competition of an acceptance exam. for joining a sport college the heights of 48 students who presents to the competition in cm were as follows

175 – 183 – 163 – 181 – 164 – 195 – 182 – 166 – 193 – 195 – 185 – 157 – 190 – 166 – 163 – 173 – 166 – 177 – 164 – 157 – 173 – 193 – 168 – 183 – 155 – 178 – 173 – 180 – 164 – 181 – 156 – 194 – 173 – 187 – 162 – 176 – 158 – 170 – 168 – 190 – 156 – 169 – 155 – 170 – 188 – 155 – 192

Form the frequency table of sets to the previous heights, then answer the following questions

- what is the number of students who have the highest heights?

What is their percentage?

- what is the number of students whose heights are less than 165 cm.

What is the percentage?

- what is your advice to those students

2 the following frequency table of sets show The shares of money in pound hold by the pupils of a class in the project of building a hospital near to the school study it and answer.

The shares in pounds	20-	30-	40-	50-	60-	70-	Total
Number of pupils	3	6	8	12	7	4	40

1 - what is the number of pupils who shared with an amount of money lies between 40 and 50 pounds?

2 - what is the number of pupils who shared with the least amount of money? what is their percentage?

3 - what is the number of pupils who shared with an amount of money = 60 pound and more ? what is their percentage?

4 - what is the least share held by the pupils? And what is their number in each case?

4 Representing the Quantative Statistics Data by the frequency curve

What do you learn from this lesson?
-through your active participation you will c:
- How to represent a frequency table of sets by frequency polygon.
- How to represent a frequency table by a frequency curve
-Extraction information's from frequency table and its frequency curve.

Mathematical concepts
- **The centre of the set**
- **The frequency polygon**
- **The frequency curve.**

Notice and deduce

Adel sat in the neighbour of his father who works at a hospital to receive the patients for two hours.

He formed a frequency table of sets to the ages of patients who were registered to enter the hospital within this period.

It was as follows.

The age	10-	20-	30-	40-	50-	60-	Total
Number of patients	6	8	12	15	10	9	60

When Adel shows this table to his teacher of the class, he asked him and from other pupils to draw a frequency polygon to represent these data. (as what had been done in 5th grade) Adel graphic the following figure.

When the teacher asked Adel How did he draw the frequency polygon

Adel replied.

I followed the following steps.

1 - I draw the horizontal axis and the vertical axis.

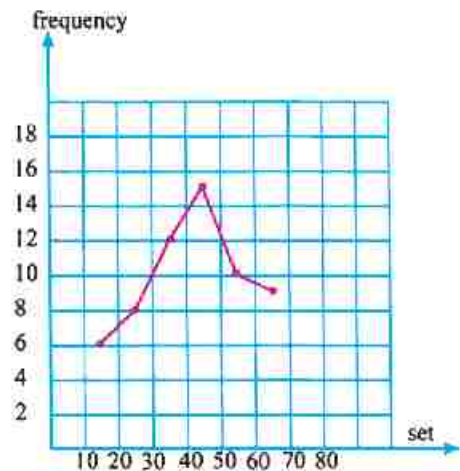
2 - I divided each of them into equal parts which are suitable for the given data.

3 - determined the centre of each set as follows.

The centre of the set (10 -) is $\frac{10+20}{2} = 15$

The centre of the set (20 -) is $\frac{20+30}{2} = 25$

And so on till the set (60-)

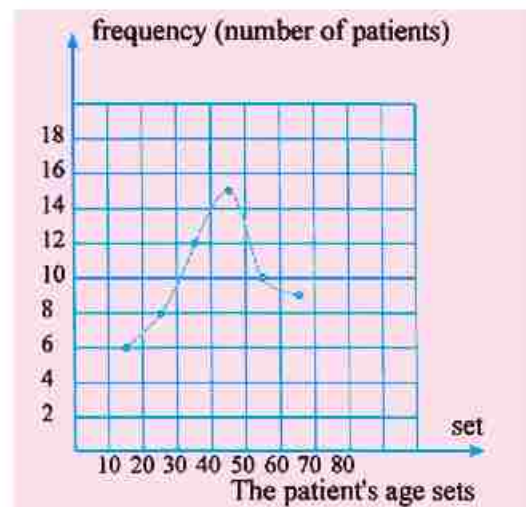
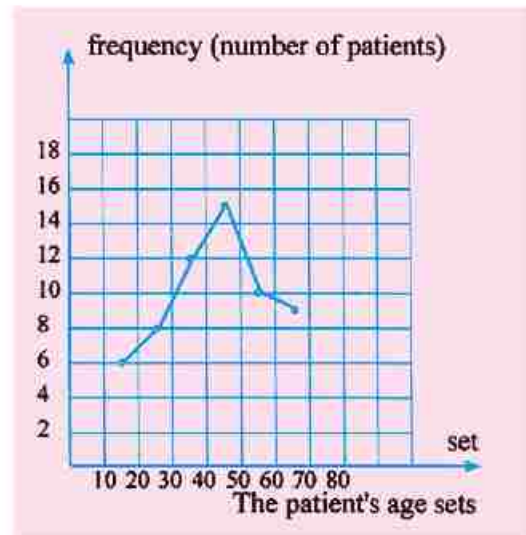
Its centre is $\frac{60+70}{2} = 65$

1 - the points where determind on the lattice where for every set there is an ordered pair which is (the centre of the set, its frequency) for example the set.
- (10 -) , the point which represents
It is (15,6) where 15 is the center.
And 6 is its frequency.
- the set (20 -) , the point which
represents it is (25,8) ….. and so an.
Then the frequency table becomes as in the opposite figure.

The patient's age sets	Number of patients frequencies	Centre of the set	The point which represents the set
10 -	6	15	(15,6)
20 -	8	25	(25,8)
30 -	12	35	(35,12)
40 -	15	45	(45,15)
50 -	10	55	(55,10)
60 -	9	65	(65,9)
Total	60		

2 - using the pencil and the ruler I drew a line segment joining each tow consecutive points of the determined points by the previous steps thus I got the graph of the frequency polygon.

The teacher : very well but if you and your fellow pupils joined the points by the bencil with out lifting it up the sheet without using the ruler then you will get another graph. What is it?

If you got the red line in the previous graph then you are correct and you got the frequency curve which passes through the most of points.

This new graph is called
The frequency curve which
Can by drawn directly new
As in the opposite graph
And it is another form
For representing the statistics data

Drill :

Ola and Nargis registered the temperature degrees which are expected for 30 cities in one of summer days through watching the news in television. They formed the following frequency table.

Temperature degree	24-	28-	32-	36-	40-	44-	Total
Number of cities	3	4	7	9	5	2	30

Draw the frequency curve of the previous table.

Then answer the following questions.

(a) What is the number of cities whose temperature's degree are 40 degree and more? What do you advice these cities' inhabitants.

(b) What is the number of cities which are suitable for summer season on that day?

(c) What are the number of cities whose temperature's degrees are mild on that day from your own view?

Exercise (4 - 4)

1 The following table shows the extra money which 100 workers got in a month in a factory . they are as follows.

The extra money	20-	30-	4-	56-	60-	70-	Total
Number of workers	20	15	30	25	10	5	100

- What are the number of workers who obtained extra money less than 50 pounds.
- Draw the frequency curve of this distribution.

2 In a goodness party for orphan's day A group of contributors paid sums of money in pounds as shown in the following table.

The sum	50-	60-	7-	80-	90-	100-	110-
Number of contributors	5	7	10	12	10	7	5

- What is the number of contributors by L. E 80 and more.?
- Represent the previous data by the frequency curve.

3 The foilowing Table shows The marks of 100 students in one month in malh

Marks	20-	30-	40-	50-	Total
Number of students	15	30	40	15	100

Draw The frequency curve for this distribution

General exercises on unit 4

1 Examine each of the front envelope page of mathematic book and the last page of the art features of the book , then extract from them at least three descriptive data and another three quantitive data.

2 In a competition hold by sport's teacher for jumping in the place.

The number of jumps carried out by the pupils of a class were as follows.

30 - 18 - 21 - 25 - 14 - 19 - 7 - 8 - 11 - 26 - 22 - 16 - 17 - 35 - 33 - 16 - 27 - 6 - 30 - 26 - 16 - 21 - 14 - 20 - 18 - 9 - 15 - 31 - 21 - 18 - 15 - 29 - 26 - 12 - 28 - 9 - 25 - 8 - 10 - 15 - 36 - 23

(a) Form the frequency table of sets for the previous jumps.

(b) Represent these data using the frequency curve.

(c) Answer the following questions.

- What is the number of students of most number of jumps? What is their percentage?
- What is the number of students of the least number in jumps? What do you advice those pupils?

3 The following table shows the number of air flights which done in Cairo airport in the period from 12 at noon till 8 in the morning of the next day.

Time	12 p.m	4p.m	8 p.m	12 p.m	4 am	Total
Number of flights	32	41	42	19	13	147

Represent these data by frequency curve then answer the following questions.

- In what time the Cairo air port is most crowded? Why?
- In what time the Cairo air port is the least crowded?
- what is the percentage of the number of flights comming to Cairo air port in the period from 12 at noon till 4 p.m.
- what is the percentage of the number of flights coming to Cairo air port after 12 a.m?

A technologyical activity.

The activity's subject

Representing data by frequency curve through Excel program in the frequency curve.

What do we learn from this activity?

- Inserting tabular data in cells. Of Excel programme.
- Drowing the frequency curve of tabular data using Excel programme.

Example

The following table shows the number of hours spent by a number of pupils dealing with computers.

The required is representing these data by the frequency curve using Excel program

Number of hours	1 -	2 -	3 -	4 -	5 -	6 -	Total
Number of pupils	8	11	15	6	4	2	46

The practical procedure

1 - Click start, select programme then select Excel.

2 - Write the data of the first row in the previous table (number of hours) in cells of the column A.

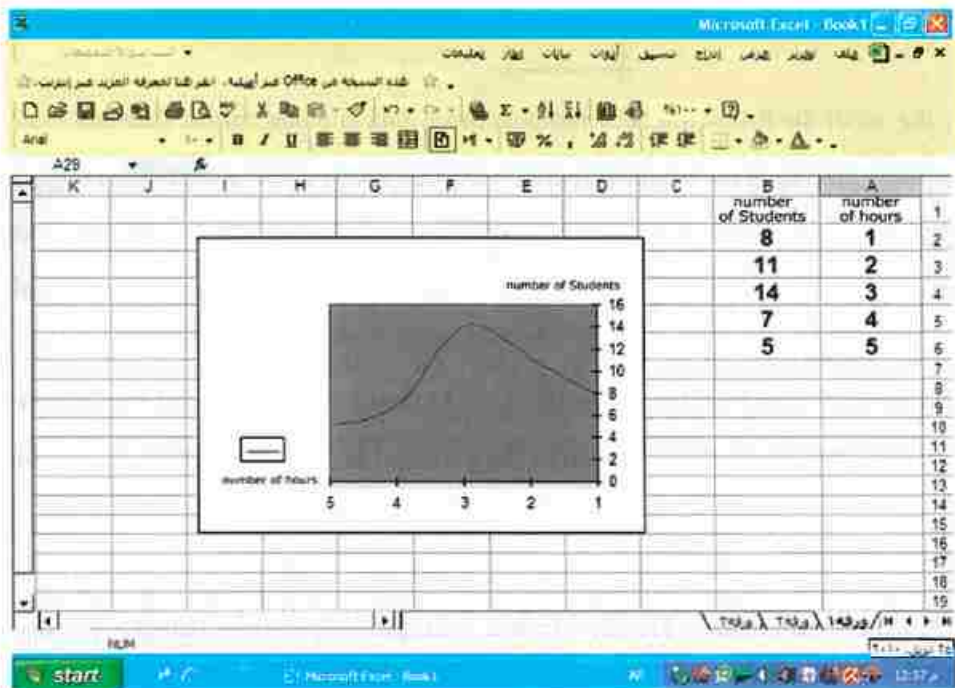
3 - Write the data of the second row in the previous table (number of pupils) in cells of the column B.

4- Determine the quantative data exist in the two columns A and B using the mouse.

5- From the menue (Insert) select chart then select custom types.

6- Write the number of pupils in the cell exsting down

7- Write the number of hours in the down cell then click next then finish

If the steps are correct the following graph will appear.

1- Read data registered on the national number card to one of your family (your father – your mother – your brother – your sister) then extract from it descriptive date and quantitive data.

2- Choose one of canned (food stuf) goods which your mother uses (oil – rice – suguar – tea – detergent – butter - ….. etc) then extract from it describtive data and quantative data).

3- Carry out a study in the a live in which you live and collect data about the ages of persons who live in this alive. Then form a frequency table of sets for the obtained data.

Ages	0-	10-	20-	30-	40-	50-	60-	Total
Number of persons								

Represent these data by the frequency curve then answer the following.

1- What is the most common age in the alive?

2- What is the number of children whose age are less than 10 years?

3- What is the number of persons whose ages are 50 years or more?

The unit test

1- Classify the set of the following data into quantitive data and descriptive data age – the colours of the nation's flag – Marks of the exam. In math – weight – social case – temperature degrees – tallness – nationality – sex – score in science – the kind of the book that you real – the colour of school uniform suit – the preferable hoppy – the number of sisters – the number of bages of Arabic book.

2- A samlpe is taken from a tourists group coming to Luxor in one day in winter the number of samlpe was 33 tourists the nationalities of the tourists the nationalities of the tourists were as follow.

Rusian – American – English – Italian – French – American – English – Rusian – French – American – Italian – Rusian – American – French – Italian – English – Rusuia – Italian – Italian – Rusian – Rusian – American – Italian – English – Rusian – English – Italian – Rusian – American

* Form a simple frequency table for the previous descriptive data then answer the following questions.

- Which nationality has the greatest number in this group? Express that by a percentage.
- Which nationality has the smallest number in this group? Express that by a percentage.
- What do you advice the responsible about tourism in Luxor.

3- In a competition for passing the acceptance exam. To a sport college., The weights of 40 student presenting to this completion were as follow.

50 – 53 – 75 – 88 – 65 – 77 – 59 – 66 – 63 – 85 – 64 – 72 – 58 – 65 – 56 – 74 – 73 – 90 – 92 – 87 – 60 – 70 – 72 – 85 – 56 – 54 – 75 – 76 – 90 – 81 – 60 – 88 – 74 – 72 – 60 – 57 – 66 – 83 – 51 – 60

(a) Form the frequency table of sets for the previous weights

(b) Draw the frequency curve of the obtained table then answer the following questions .

- What is the number of the students who have the greatest weights? What is their percentage?
- What is the number of students whose weights are less than 60kg? What is their percentage?

Guide answers to the general tests of the units and the model of test of first term.

The first unit test (the ratio)

1- (20.5) 2- (10, 15, 20cm) 3- (5litre/ 3km)

4- (a) (1 : 2), (b) (2 : 3), (c) (6 : 5), (d) (1 ; 10)

5- (8 : 15)

The second unit test (proportion)

1- (- 12), 2- ($\frac{33}{100}$, $\frac{1}{8}$, $\frac{3}{7}$) 3- (192, 160, 228)

4- (LE 3740), 5- (6 metre), 6- (40 litre)

1- (a) one of its angles is right., (b) 12000 cm^3

(c) 0.00258 m^3, (d) the base area x height

(e) 2650 cm^3

2- 118, 35.

3- (a) the pattern is

(b) the patterns

4- 35000 cm^3

5- the length = 24cm

6- 125

7- 3.375 litre, 27 pounds

The 4th unit test (statistics)

Nationality	Rus.	Ame.	Ita.	French	Eng.	Total
The number	9	7	8	4	5	33

Sets	50-	55-	60-	65-	70-	75-	80-	85-	90-	Total
Frequency	4	5	6	4	7	4	2	5	3	40

The answer of the model test

First question :

1- 1 / 3 2- 6 3-age 4- 4.5

5- 216 6- 5

Second question :

1- The first number / The second number
2- The parallelogram, the square, the rectangle the rhombus.
3- The edge length × itself × itself
4- The volume of the liquid which fills the vessel completely.
5- 60 – 20 = 40
6- 8 / 40 = 1 / 5 = 20%

Third question :

a) 1500 , 2400 b) 11 metre

c) = 8765 cm^3 d)80 , 70 , 21 cm

Fourth question :

a) 2880 , 1920 , 1440

b) 8 kirats, 4 kirats

5th question :

2 pupils , from 3 – 4 hours 40 %

Sixth from primary (First term)

Model (1)

(Question 1) Complete the following stalements :

(1) 39 days ≃ .... weeks.

(2) The volume of a Cuboid is 64 cm^3 and the area of its base 16 cm^2, then its height = ... cm

(3) If the real length of an insect is 0.3 mm and its length in a picture is 4.5 cm, then the drawing scale = ... : ....

(4) The area of the Triangle = $\frac{1}{2}$ × .... × ....

(5) If A : B = 2 : 3 , B : C = 3 : 5, then A : C = ...

(6) The opposite table shows the Marks of 40 students in one test, then the number of students who got less then 30 marks = ...

Marks	10 -	20 -	30 - 40
Number of Students	10	13	17

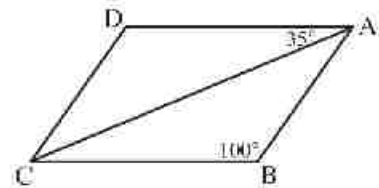
(Question 2) Choose the Correct Answer :

(1) The range of the set of values 7, 3, 6, 9 and 5 is .... (2 , 4 , 6 , 12)

(2) $\frac{3}{4}$ = ... (decimal form) (0.2 , 0.5 , 0.25 , 0.75)

(3) An agricultural tractor ploughs 28 feddans in 4 hours, the time which needed to ploughs 42 feddans is .... (4 , 6 , 7 , 8)

(4) In the opposite figure : ABCD is aparalle logram, m (∠ ACD) = ... °

(35° , 45° , 100° , 180°)

(5) If $\frac{2}{5} = \frac{X}{15}$, then X = ... (2 , 5 , 6 , 15)

(6) The following data are descriptive data except

(favorite colour , age , birth place , blood specie)

(Question 3)

(a) A contains has 12 litres of oil, it is wanted to put it in small bottles the Capacity of each of them is 400 cm^3. Calculate the numbur of bottles which needed .

(b) If the buying price of electric sets is LE 72 000 and sold at 12% profit, Calculate the selling price.

(Question 4)

(a) The ratio among the measures of the angles of a triangle is 2 : 3 : 4 find the measure of each angle in this triangle.

(b) Ametellic cube of edge length is 12 cm it needs to be conveted it into ingots in the shape of Cuboid each of them of dimensions 3, 4, and 6 cm Calculate the number of ingots that are obtained.

(Question 5)

(a) Two persons started a commercial business the first paid LE 5000 and the socond paid LE 8000, at the end of the year the net profit was LE 3900. Calculate the share of each of them from the profit.

(b) The following table shows the marks of 100 students in one month in maths test.

Marks	10 -	20 -	30 -	40 - 50	Total
Number of students	15	30	40	15	100

Draw the frquency curve of this distribubins.

Model (2)

(Question 1) Choose the Correct Answer :

(1) If one angle of a parallologram is right, then it is called a ....

(rectangle , square , rhombus , cube)

(2) $\frac{24}{5}$ = ... ($4\frac{1}{5}$, $3\frac{2}{5}$, $4\frac{4}{5}$, $2\frac{4}{5}$)

(3) If the marks of 6 students in one exam is 29 , 33 , 57 , 40 , 36 , 49 then the range of these marks = ... (32 , 33 , 28 , 86)

(4) If $\frac{4}{6} = \frac{12}{x}$, the $x + 2$ = ... (16 , 18 , 20 , 22)

(5) $1\frac{3}{4}$ = ... % (25 , 50 , 75 , 175)

(6) $\frac{513}{614}$ .... $\frac{432}{145}$ (> , < , = , ≤)

(Question 2) Complete the following statements :

(1) The data: the age, the tall, the weight and favorite food are quantative data except ....

(2) A wooden box in the form of a Cube, its external volume is 1000 cm^3. its capacity is 729 cm^3, then the volume of the wood of the box = ... cm^3.

(3) The following table shows the marks of 50 students in one month in maths, the number of pupils whose marks less than 40 is ....

Marks	10 -	20 -	30 -	40 - 50	Total
Number of students	5	15	20	10	50

(4) If the height of the fence of the villa in the design is 5 cm and its real hieght is 6 meters then the drawing scale is .... : ....

(5) $\frac{3}{4} + 5\frac{1}{2}$ = 7 - ....

(6) A Car Consumes 20 litres of Petrol to Corer a distance 250 km, then the rate of consumption of the Car = ...

(Question 3)

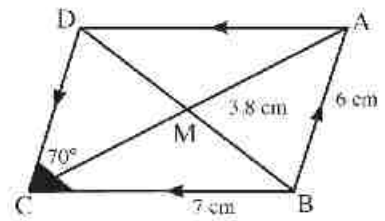
(a) Three persons started in business. The first paid 15000 pounds, the socond paid 25000 pounds and the third paid 20000 pounds. at the end of the year the net profit was 5520 pounds. Calculate the share of each of them.

(b) 10 Litres of water were poured in avessel in the shape of a cuboid, its base is square of side length is 25 cm find the height of the water in the vessel.

(Question 4)

(a) In one of our schools, there are 360 students, if the ratio between the boys and the girls was 1 : 2 find each of the number of boys and girls.

(b) In the opposite figure : ABCD is a parallelogram in wich AB = 6 cm, BC = 7 cm , BM = 3.8 cm, m ($\angle$C) = 70° . Whithout using geometrical instraaments find :

m ($\angle$ADC), the perimeter of Δ BCD.

(Question 5)

(a) Heba bought a Mobil for 660 pounds with a discount 15%. Calculat the price of this mobil before the discount.

(b) The following table shows the number of hours which spent by 46 pupils to study their lessons daily :

Number of hours	1 -	2 -	3 -	4 -	5 - 6	Total
Number of pupils	6	3	8	12	11	40

Represent these data using the frequency curve.

Model (3) (لطلاب الدمج)

(Question 1) Complete the following statements :

(1) 5000 gram : 8 Kilograms = ... : .... (in the simplest form).

(2) $\frac{3}{10}$ = ... %

(3) The volume of a Cuboid = the area of base x ....

(4) 3 Litres = ... cm^3 .

(Question 2) Choose the correct Answer :

(1) The range of the set of values 50, 25, 35, 20 is ....

(10 , 20 , 30)

(2) If $\frac{2}{3} = \frac{10}{x}$, then x = ... (6 , 15 , 20)

(3) The diagonals are perpendicular in a ....

(rectangle , square , parallelogram)

(4) If the real length is 6 m and the drawing length is 6 cm then the drawing scacle is .... (1 : 10 , 1 : 1000 , 1 : 100)

(Question 3) Choose from Column (A) to a the suitable one from the Column (B):

	A	B
1	The Cube has .... edges	* minimization
2	If (The drawing scale < 1) this expresses	* 12
3	The ratio between the side length of the square and its primeter = ... :	* 90°
4	All the angles of the rectangle are equal in measure and the measure of any of them = ...	* 1 : 4

(Question 4) Put true (✓) or false (×) :

(1) The numbers 1 , 2 , 6 and 12 are proportional numbers ( )

(2) If the number of bays was 35% from the total of the number. of the pupils, then the number of the girls is 20% ( )

(3) The favorite colour is descriptive data ( )

(4) The Volume of a Cube of edge length 3 cm = 9 cm^2 ( )

(Question 5)

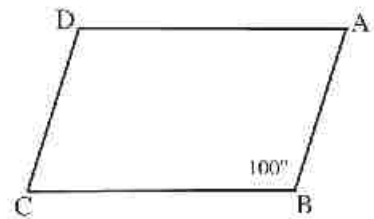
(a) Complete the following shtements :

(1) If A : B = 2 : 3 , B : C = 3 : 5

then A : C = ... : ....

(2) in the opposite figure :

ABCD is a parallelogram,

m (∠ D) = ... °

(b) The following table shows the marks of 50 students in one month in maths :

Marks	10 -	20 -	30 -	40 - 50	Total
Number of students	6	10	20	14	50

Complete :

(1) The number of pupils whose marks are less than 20 = ... pupils

(2) The number of pupils whose marks are 40 or more = ... pupils

المواصفات الفنية

المقاس	عدد الصفحات بالغلاف	ورق المتن	ورق الغلاف	طباعة المتن	طباعة الغلاف	التجليد	رقم الكتاب
$\frac{1}{8}$ (٥٧×٨٢)	١٢٤	٨٠ جرام	٢٠٠ جرام	٤ لون	٤ لون	بشر	١٥٢٣/١٠/١٥/١١/٦/٤٦

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صندوق تأمين ضباط الشرطة